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Bettacchini

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(54) **PLANER AND THICKNESSER**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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Related U.S. Application Data

(62) Division of application No. 12/424,669, filed on Apr. 16, 2009, now Pat. No. 7,913,728, which is a division of application No. 12/004,840, filed on Dec. 21, 2007, now Pat. No. 7,588,063, which is a division of application No. 11/068,300, filed on Feb. 28, 2005, now Pat. No. 7,527,080.

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B27C 5/04 (2006.01)
B27C 1/12 (2006.01)

(52) **U.S. Cl.** **144/253.8**; 144/114.1

(58) **Field of Classification Search** 144/114.1, 144/117.1, 253.1, 253.5–253.8
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,872,957	A *	2/1959	Eschenburg	144/253.8
4,971,123	A *	11/1990	Braunbach	144/253.8
6,026,870	A *	2/2000	Liu	144/253.8
6,250,349	B1 *	6/2001	Crofutt	144/253.5
6,478,060	B1 *	11/2002	Liao	144/253.8
7,527,080	B2 *	5/2009	Bettacchini	144/114.1
7,588,063	B2 *	9/2009	Bettacchini	144/117.1
7,913,728	B2 *	3/2011	Bettacchini	144/117.1

* cited by examiner

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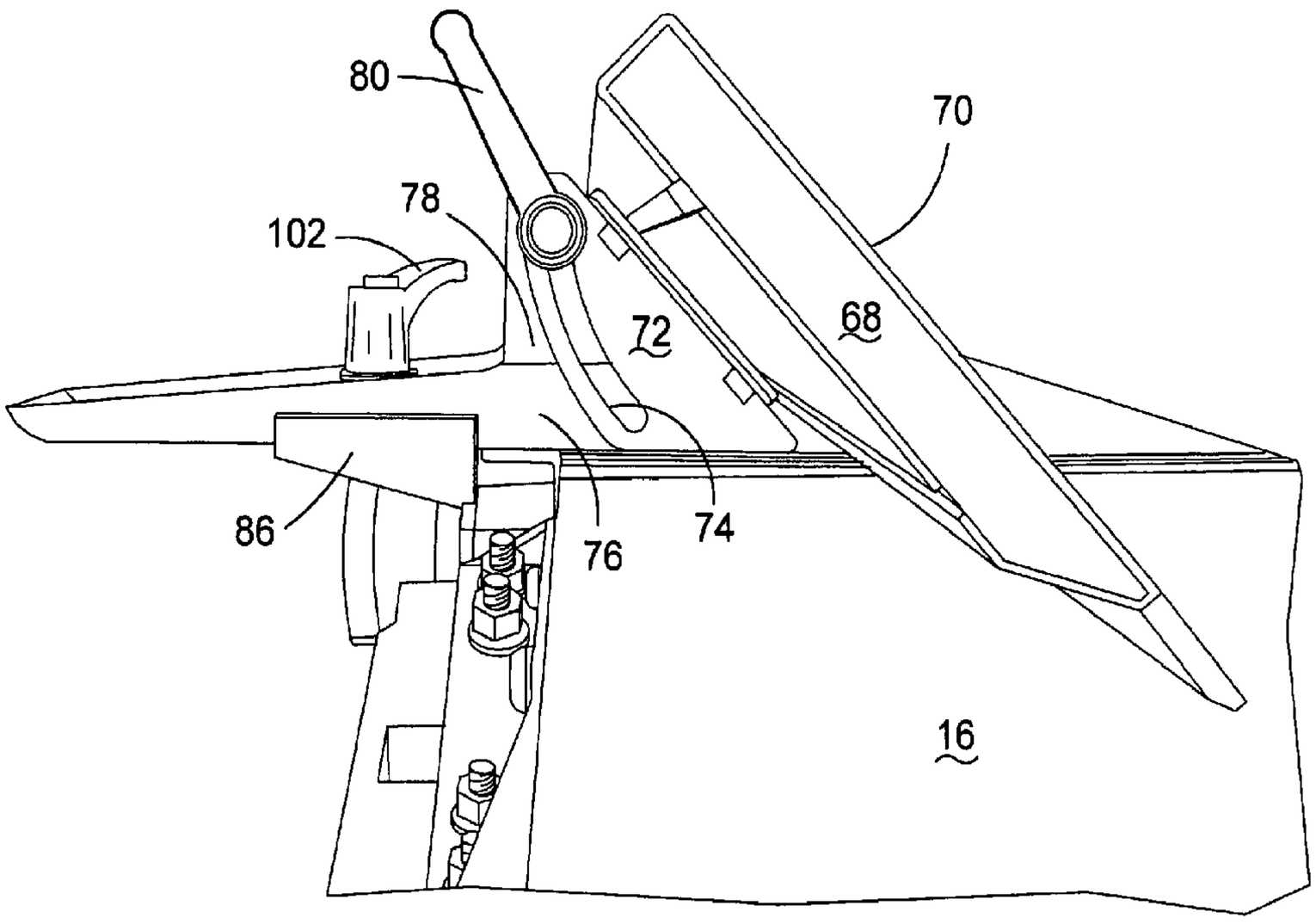
(57) **ABSTRACT**

A planer and thicknesser comprising a frame having a passageway that substantially extends through the frame. The planer and thicknesser further comprises an upper table having front and rear sections mounted on the frame, wherein a slot is located between the front and rear sections of the upper table, and a lower table moveably mounted within the passageway. The planer and thicknesser also comprises a cutting drum rotatably mounted within the frame such that a portion of the cutting drum projects upwardly through the slot and a portion of the cutting drum projects downwardly into the passage way. The planer and thicknesser also comprises a cover mounted above the upper table capable of being moved from a first position where it covers a portion of the cutting drum to a second position where it does not cover a portion of the cutting drum.

8 Claims, 25 Drawing Sheets



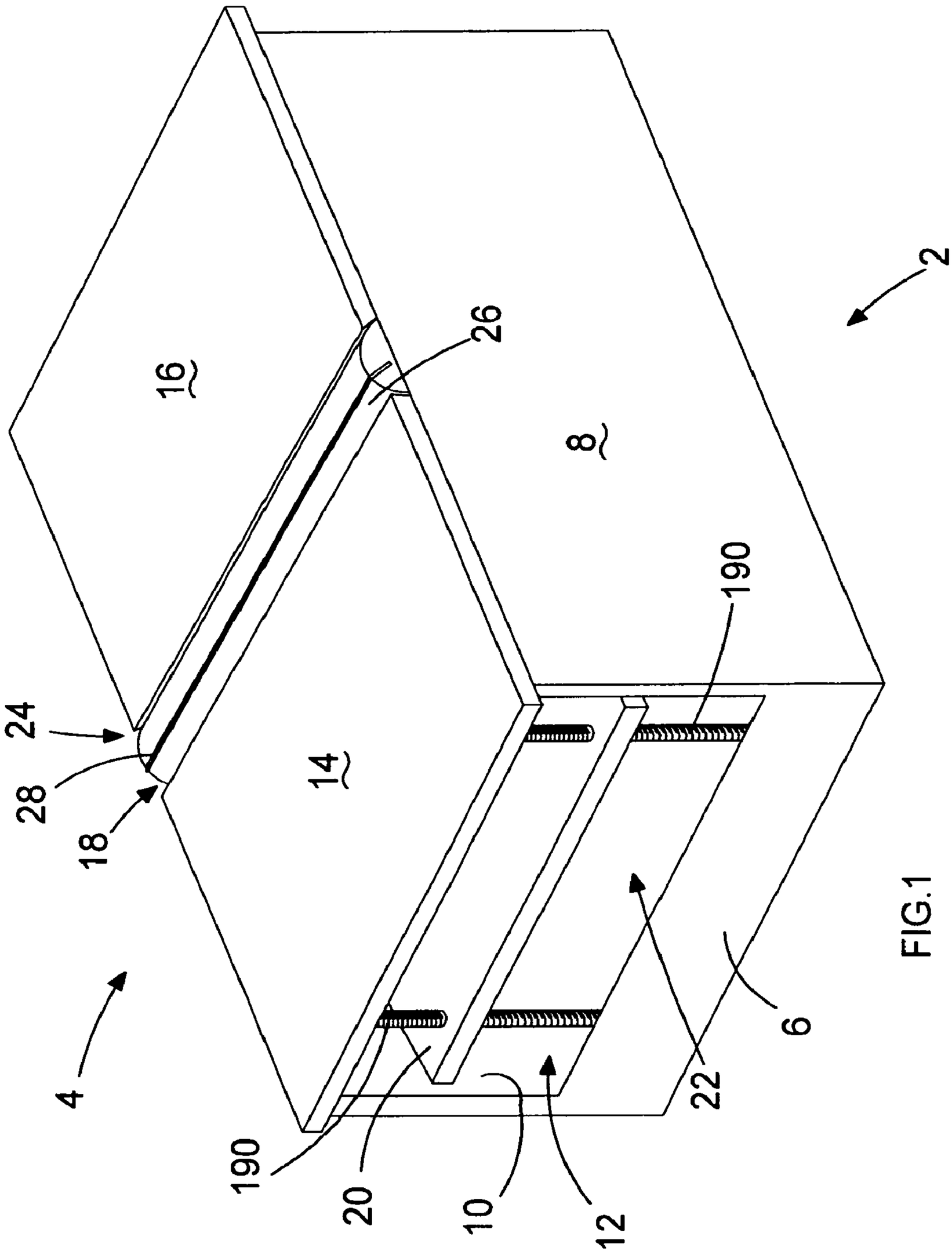


FIG.1

FIG.2

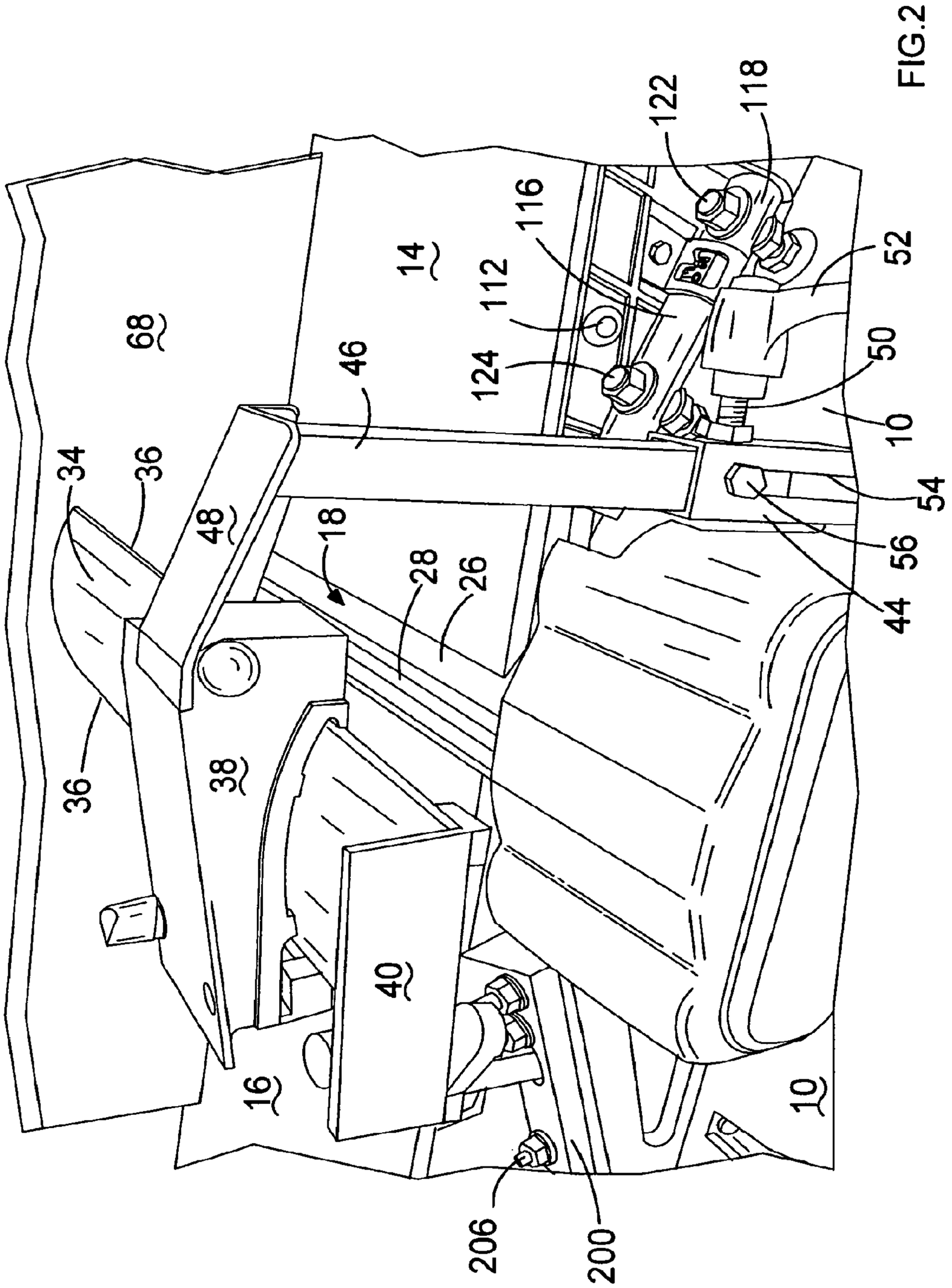

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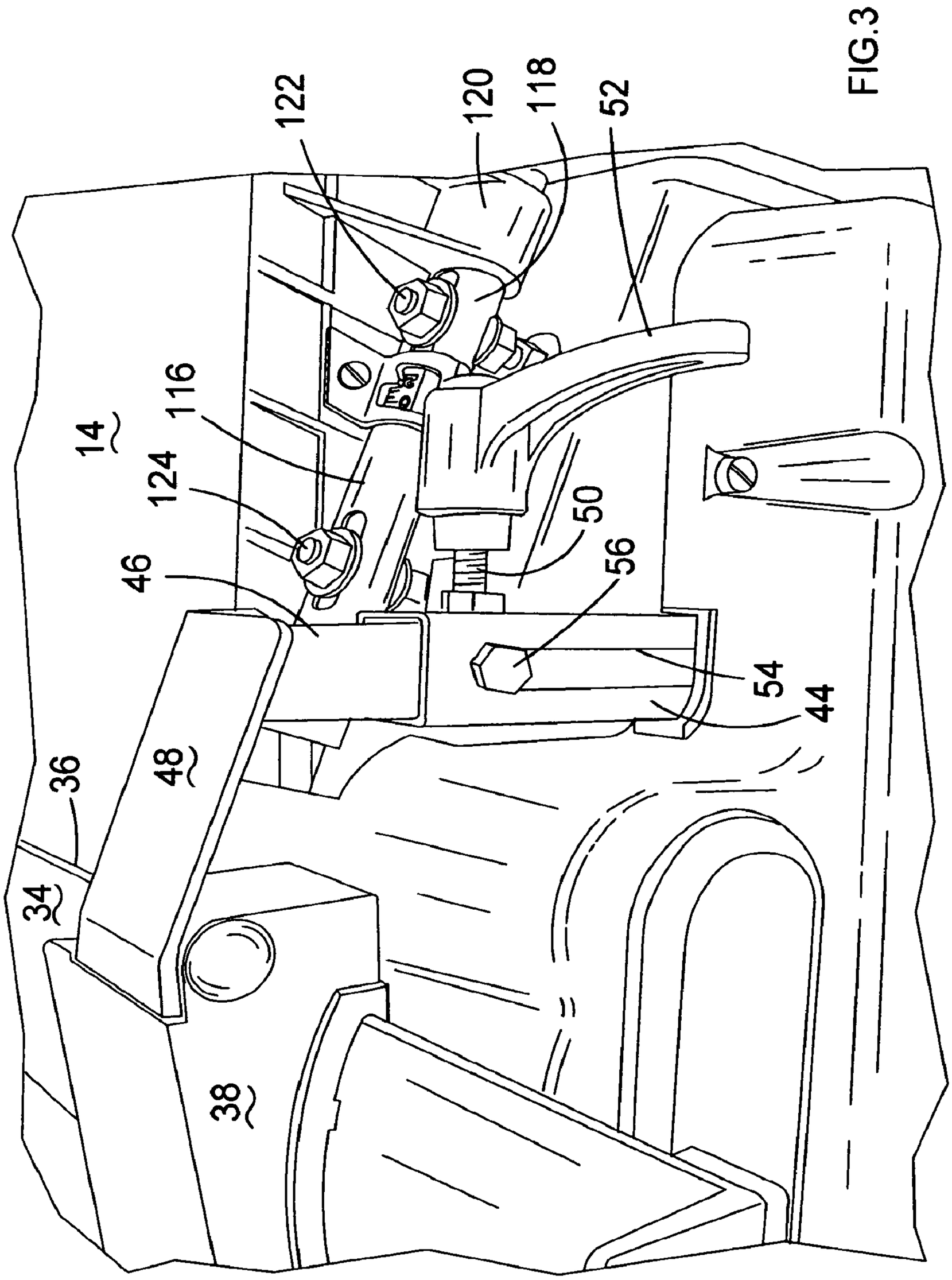
FIG.3



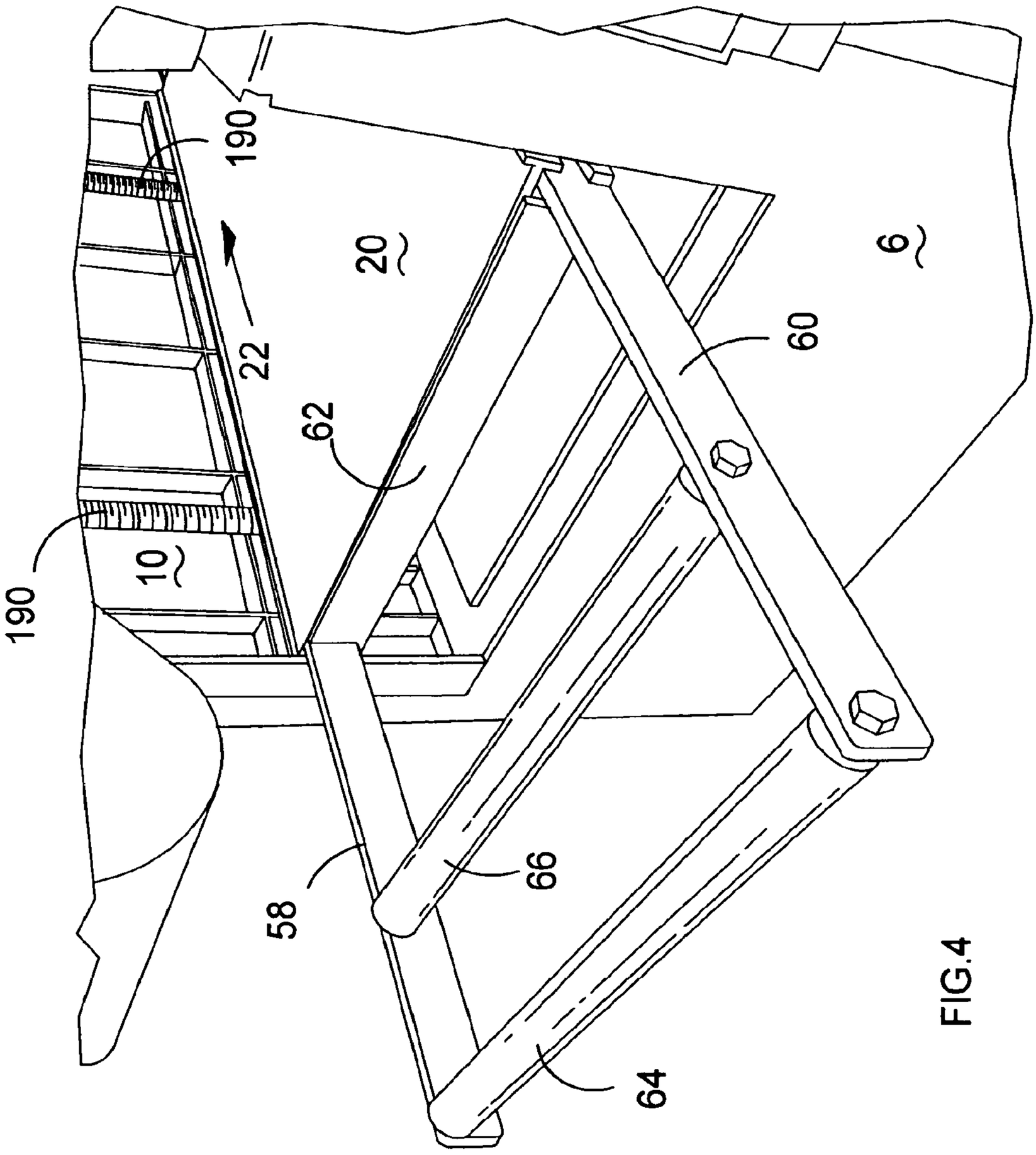
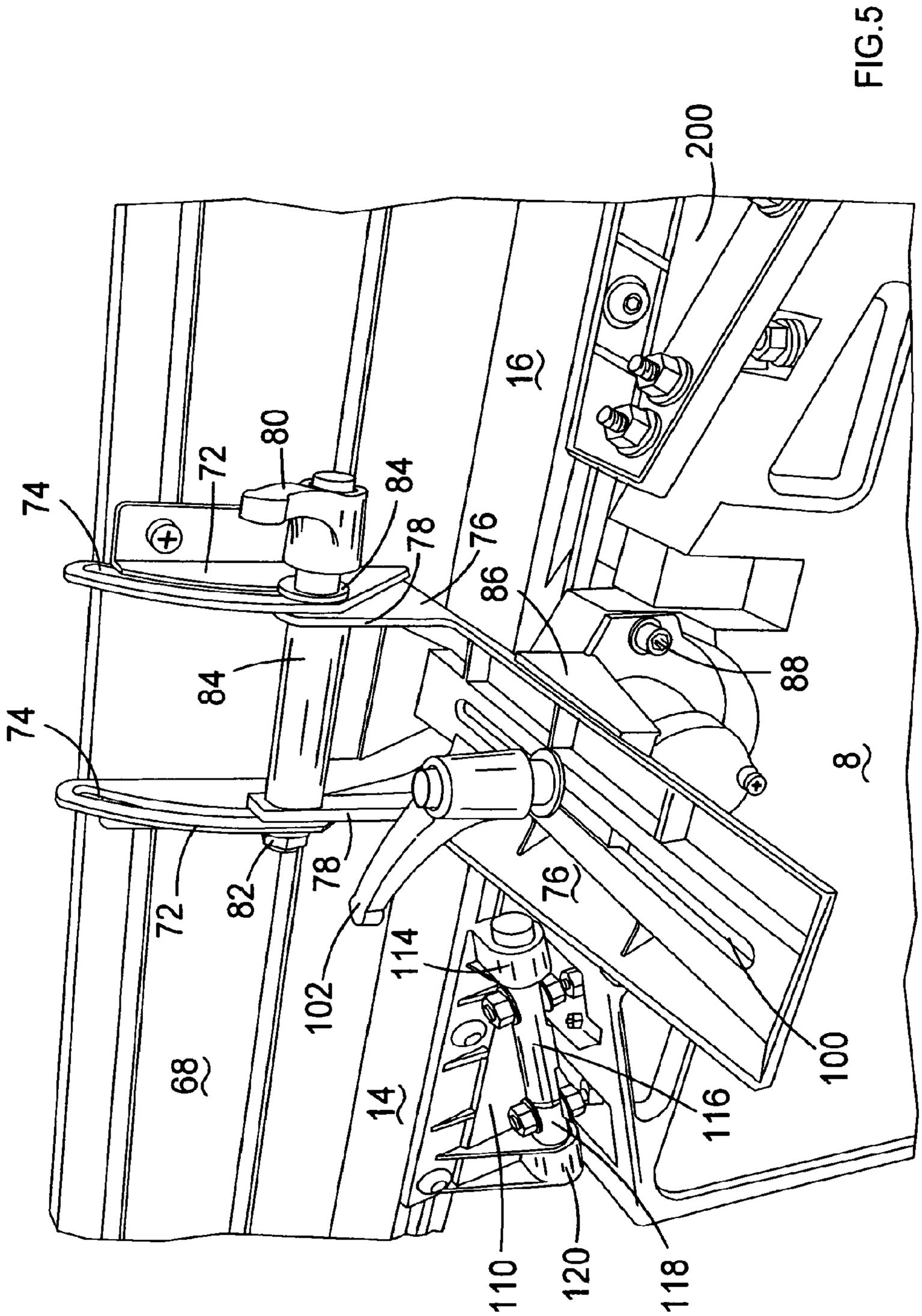


FIG.4

FIG.5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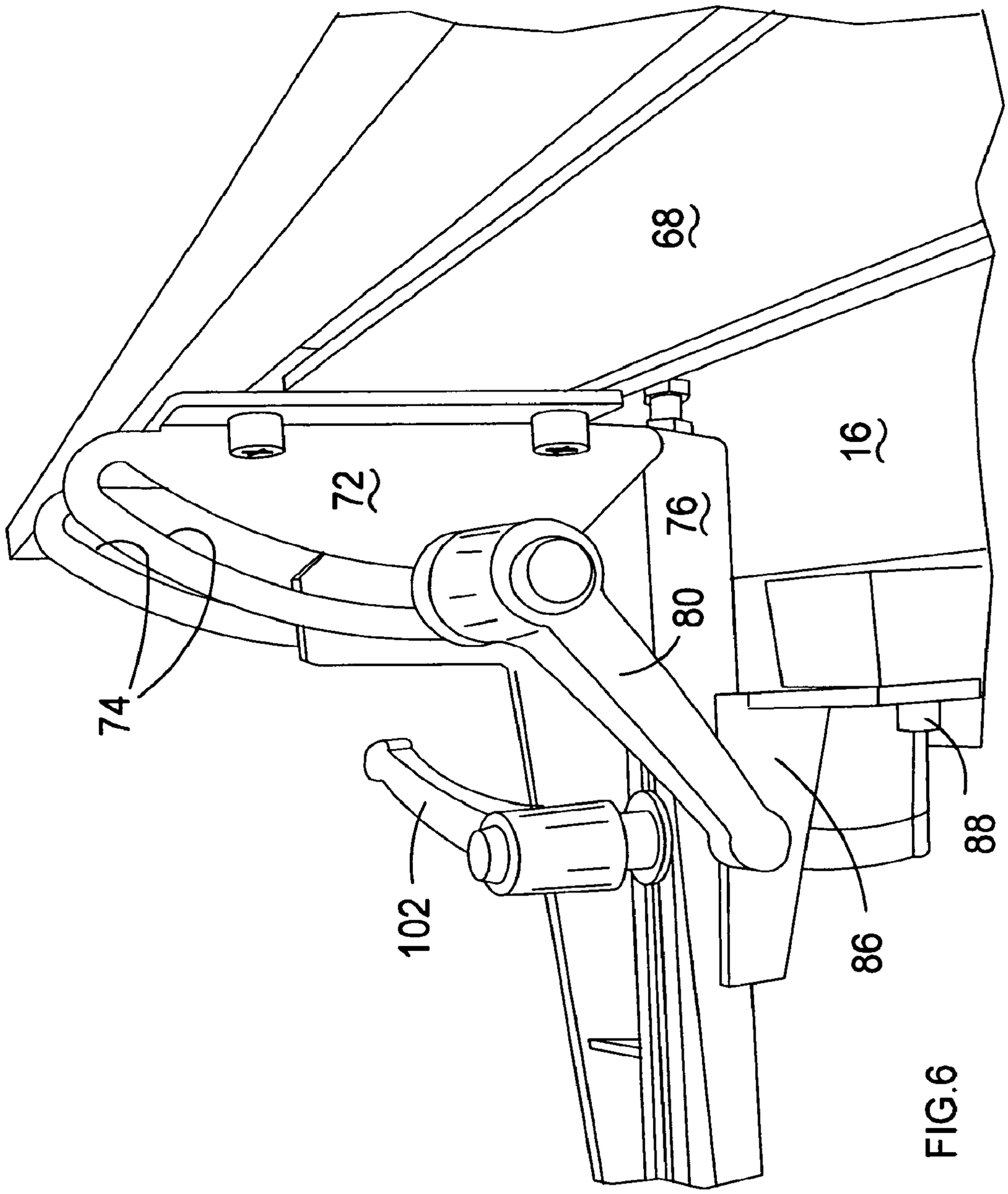


FIG.6

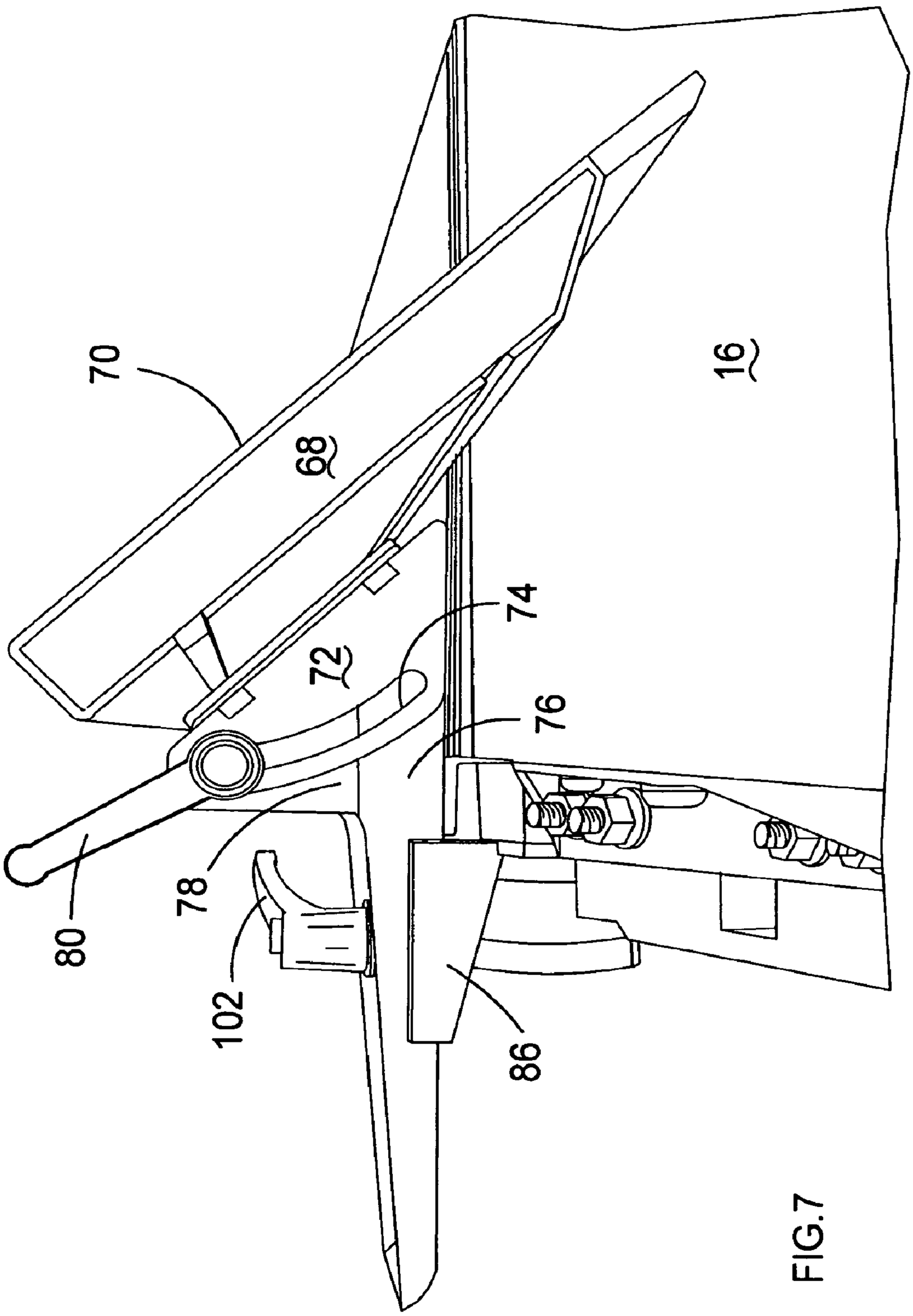
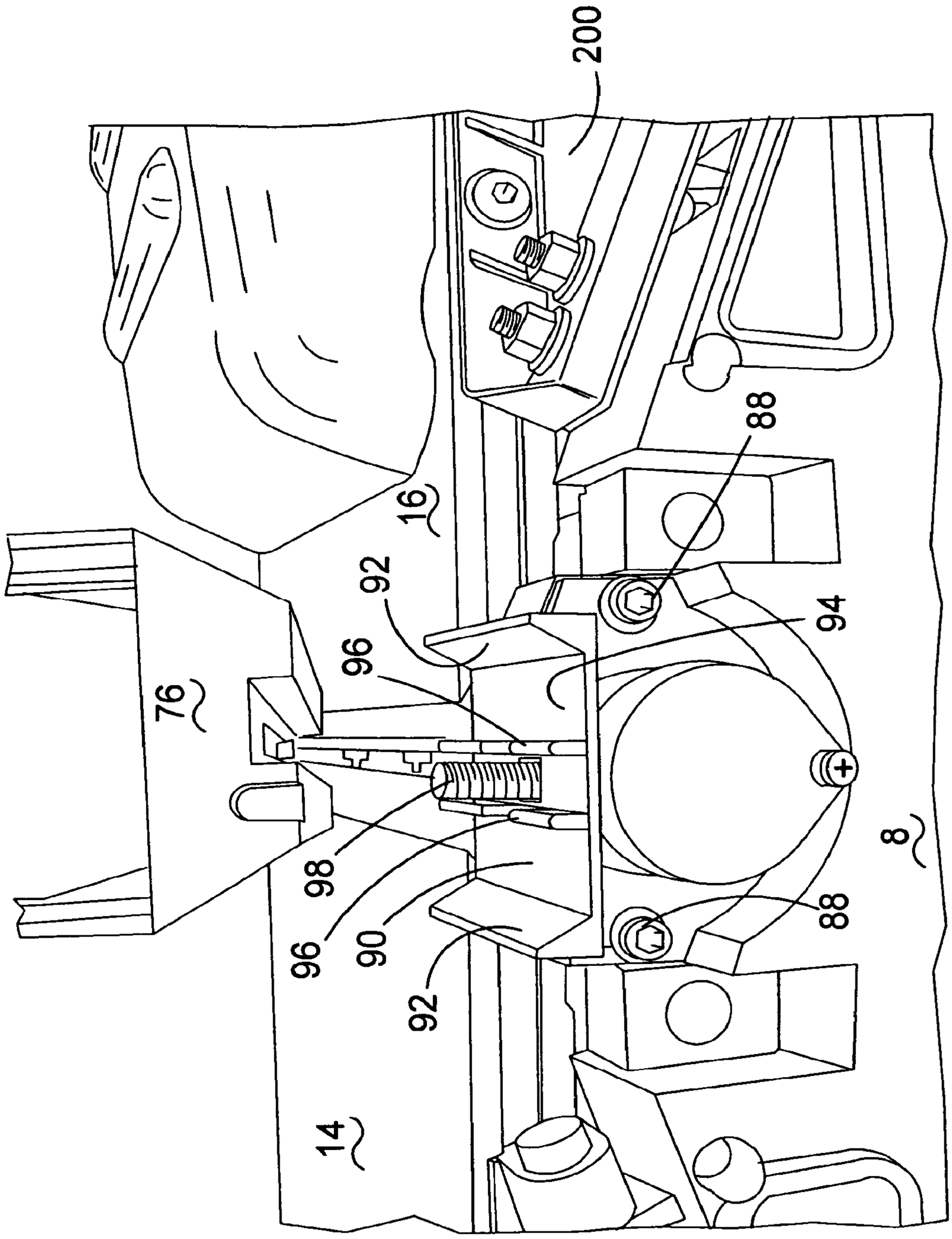


FIG.7



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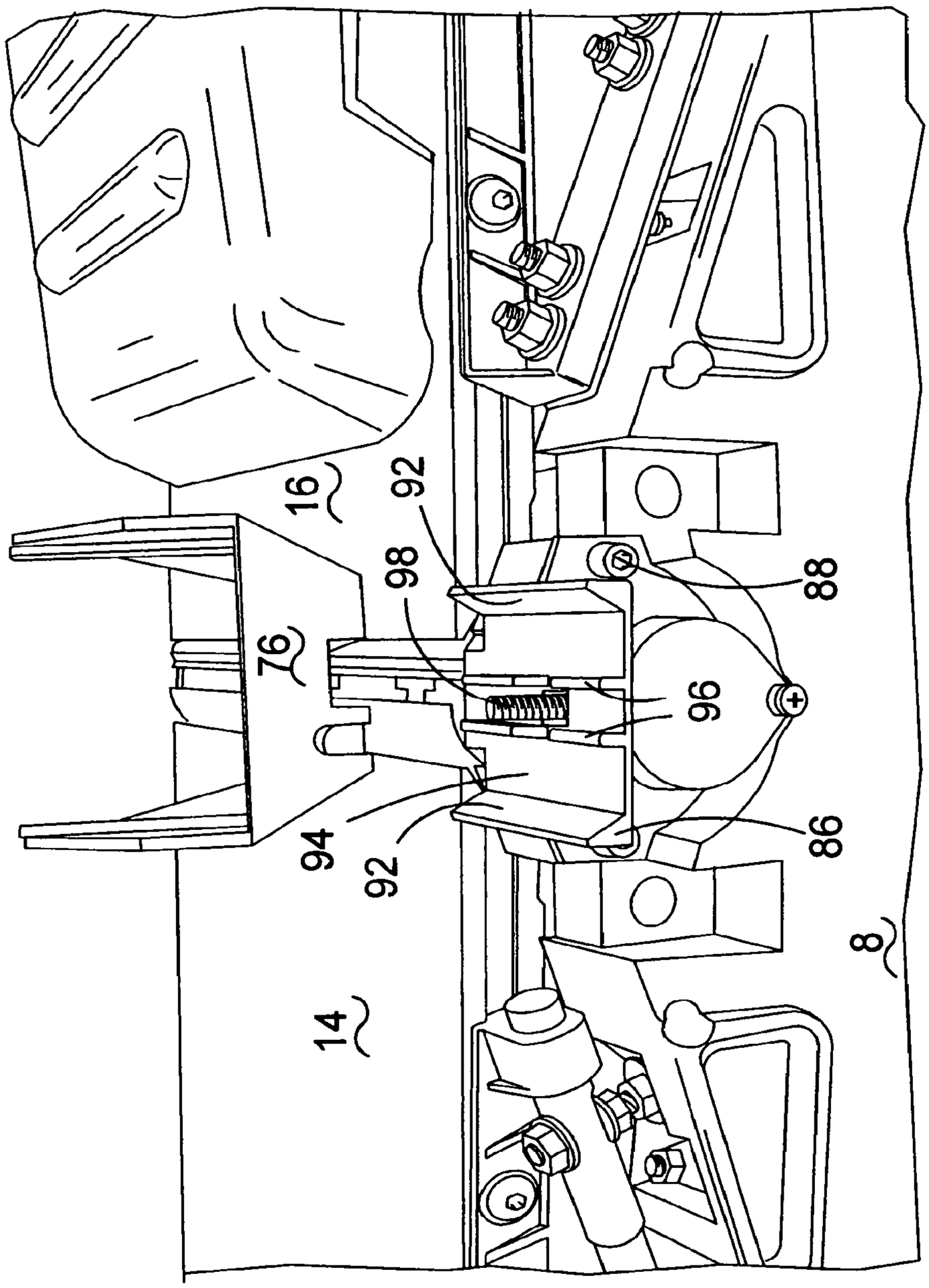

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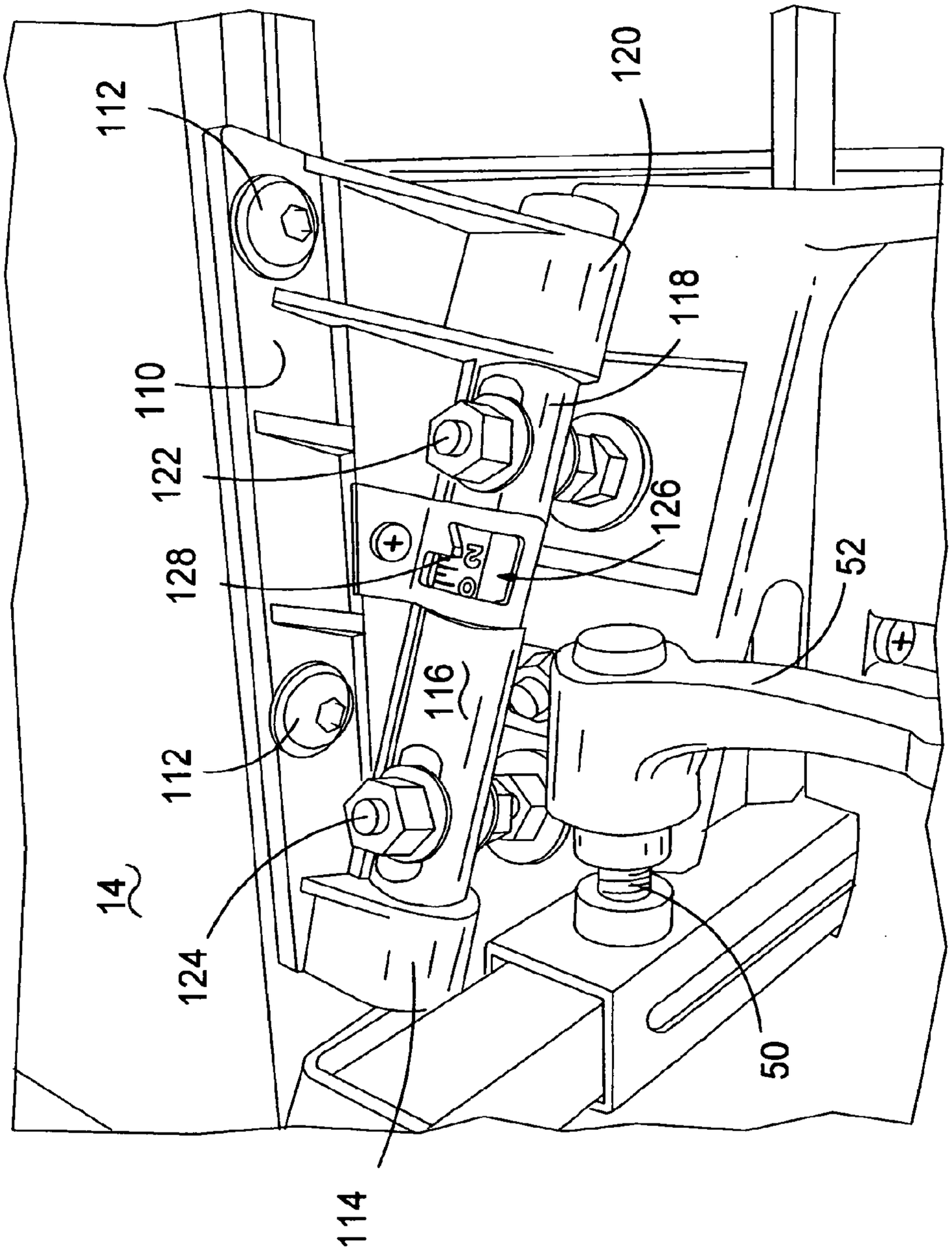
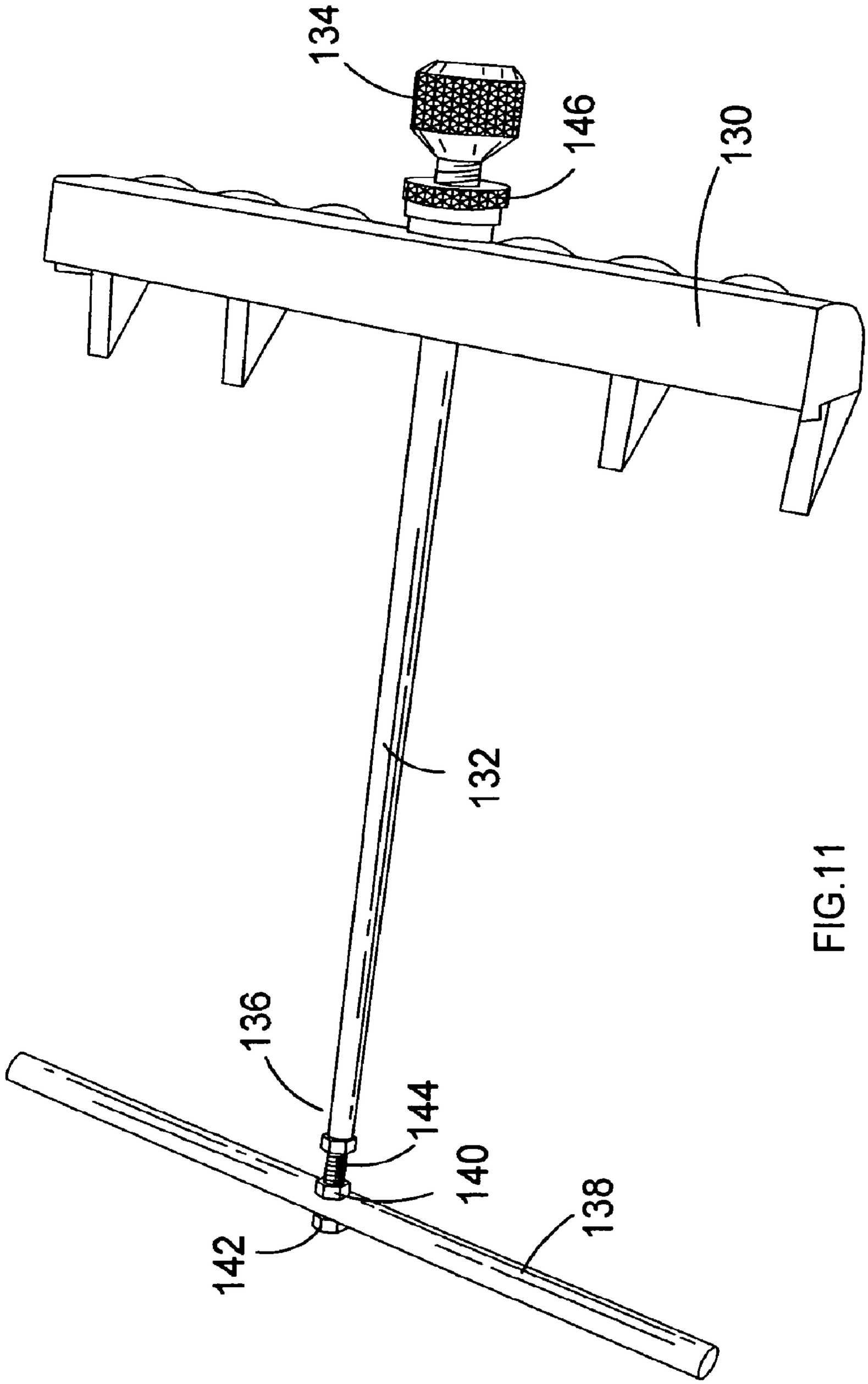


FIG.10



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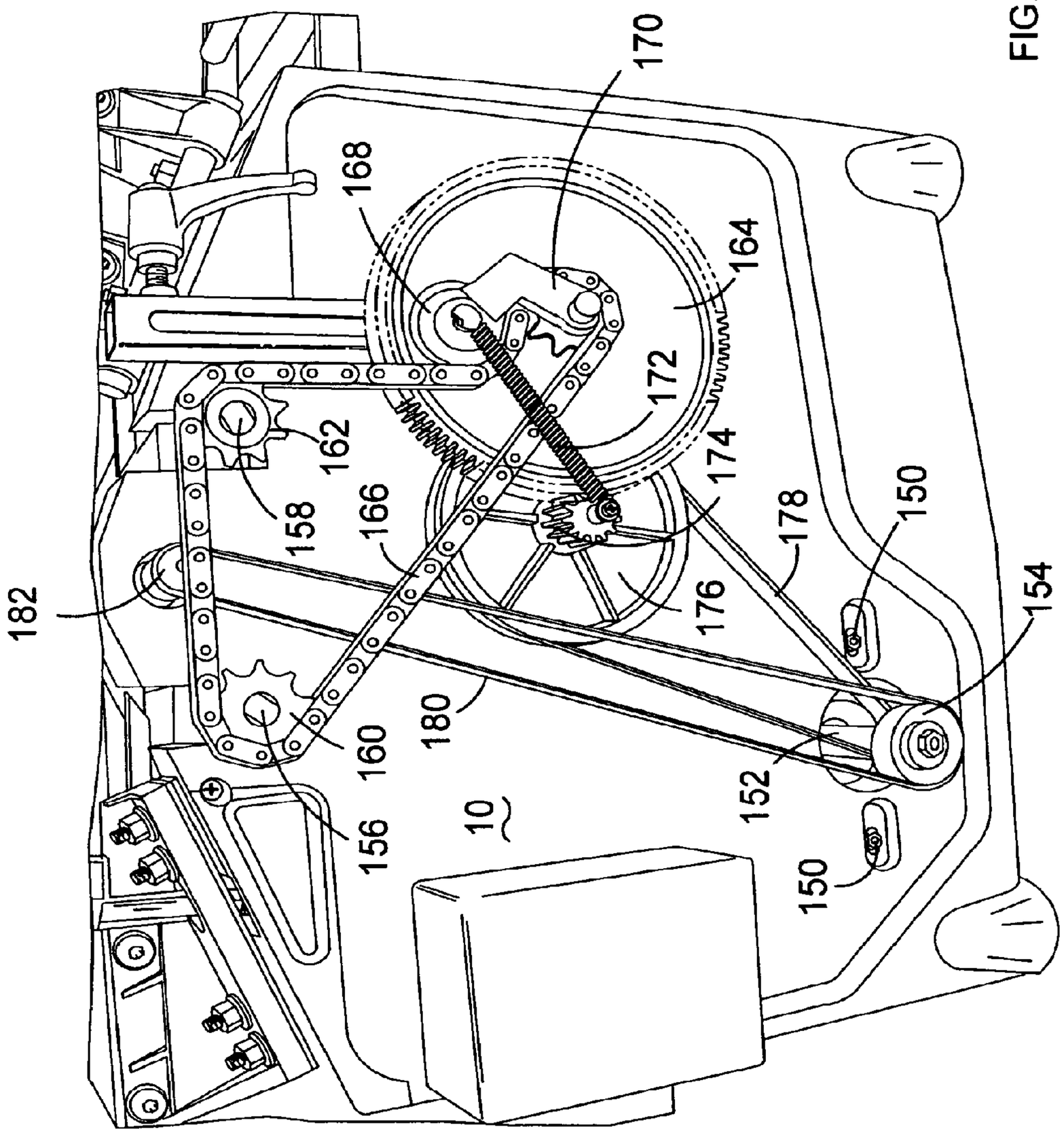
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FIG.12

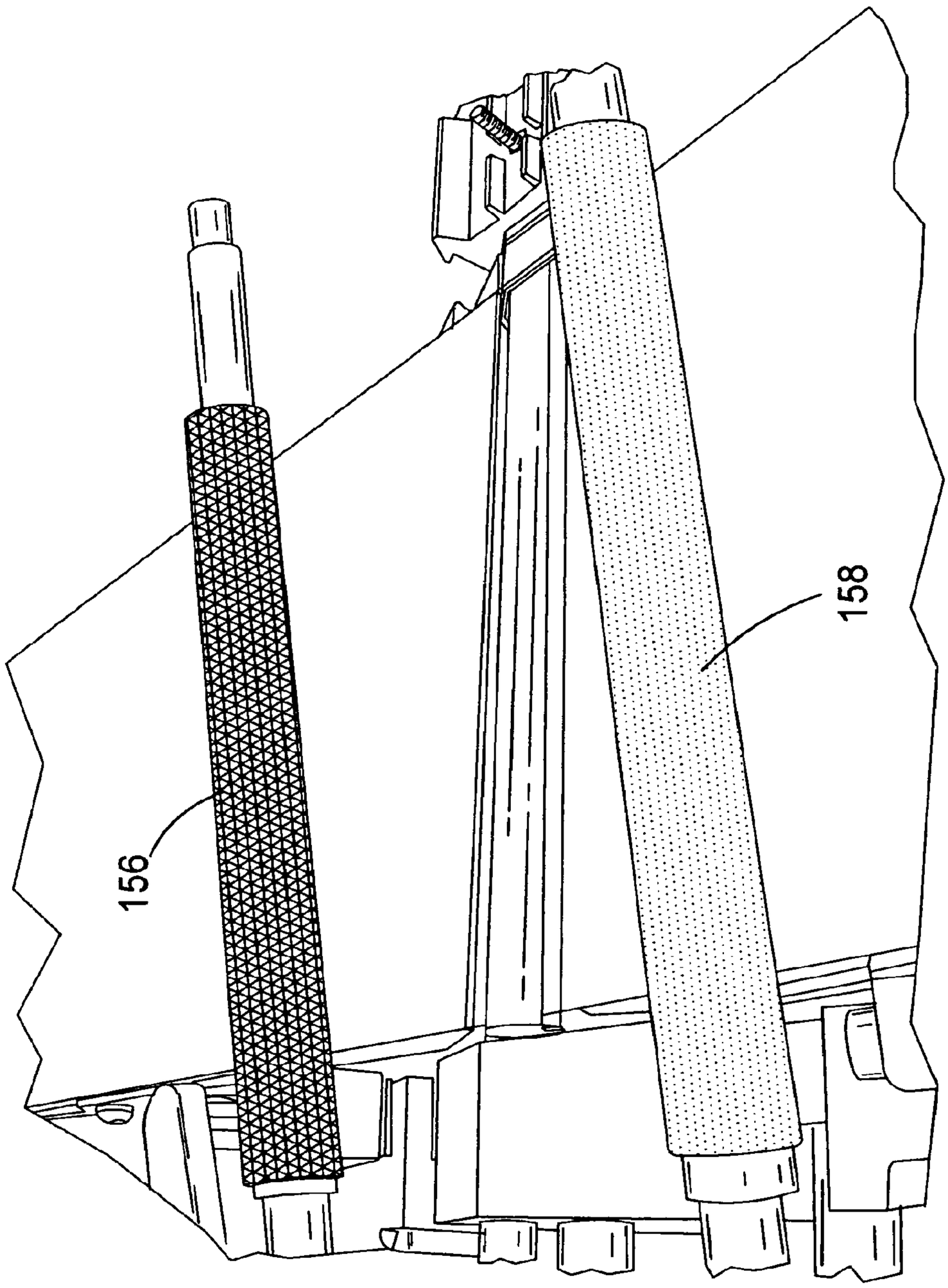


FIG.13

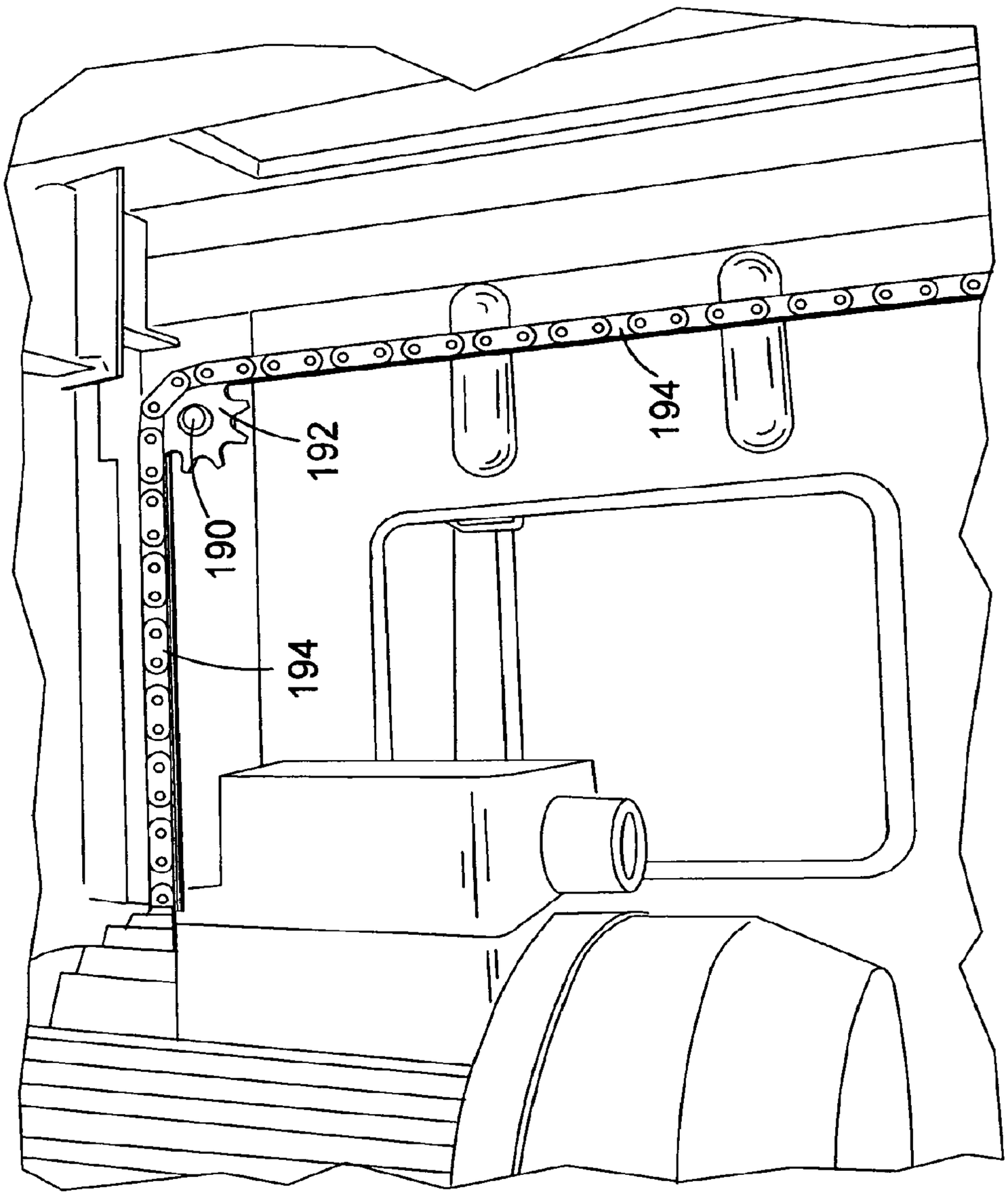
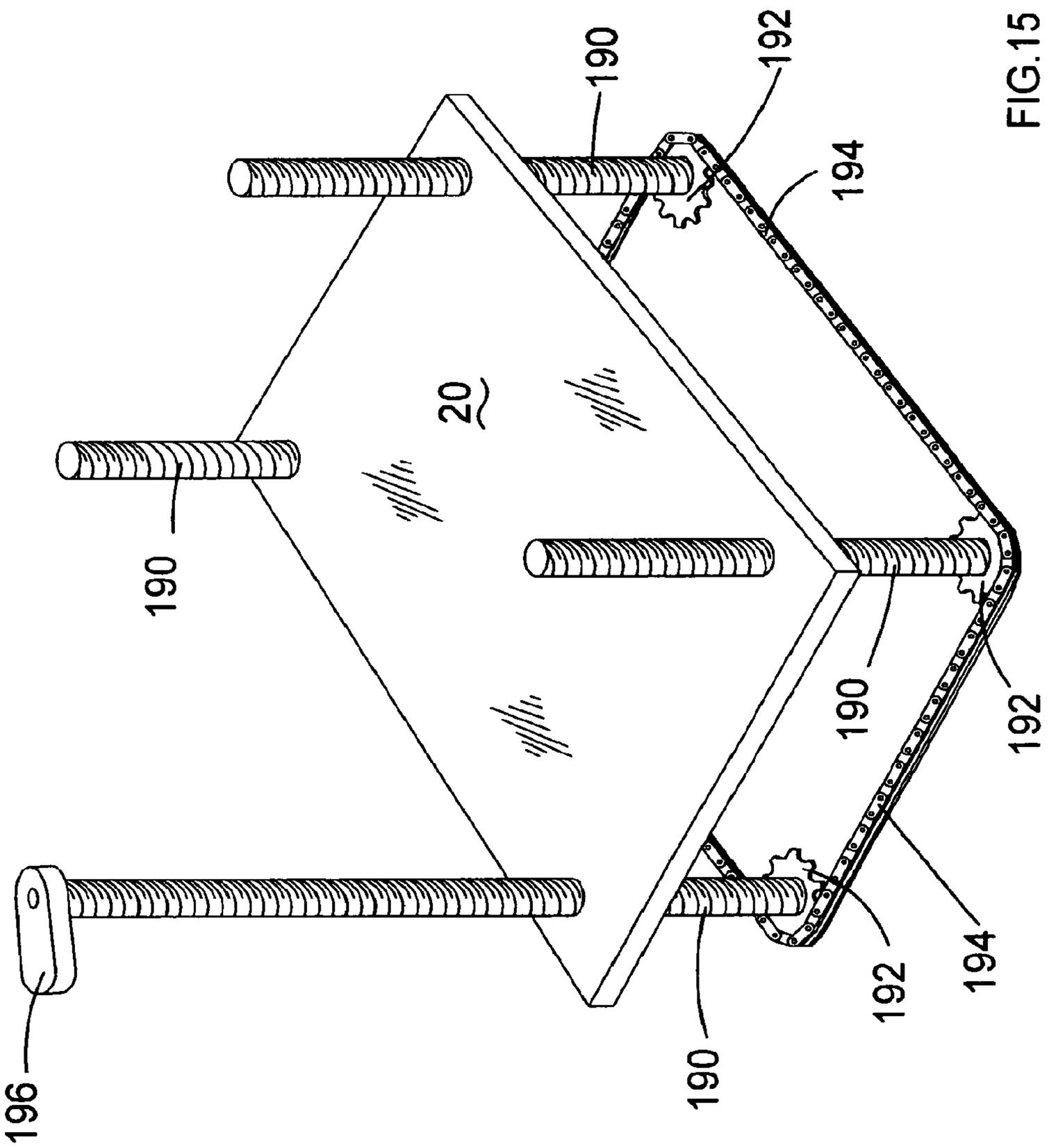


FIG.14



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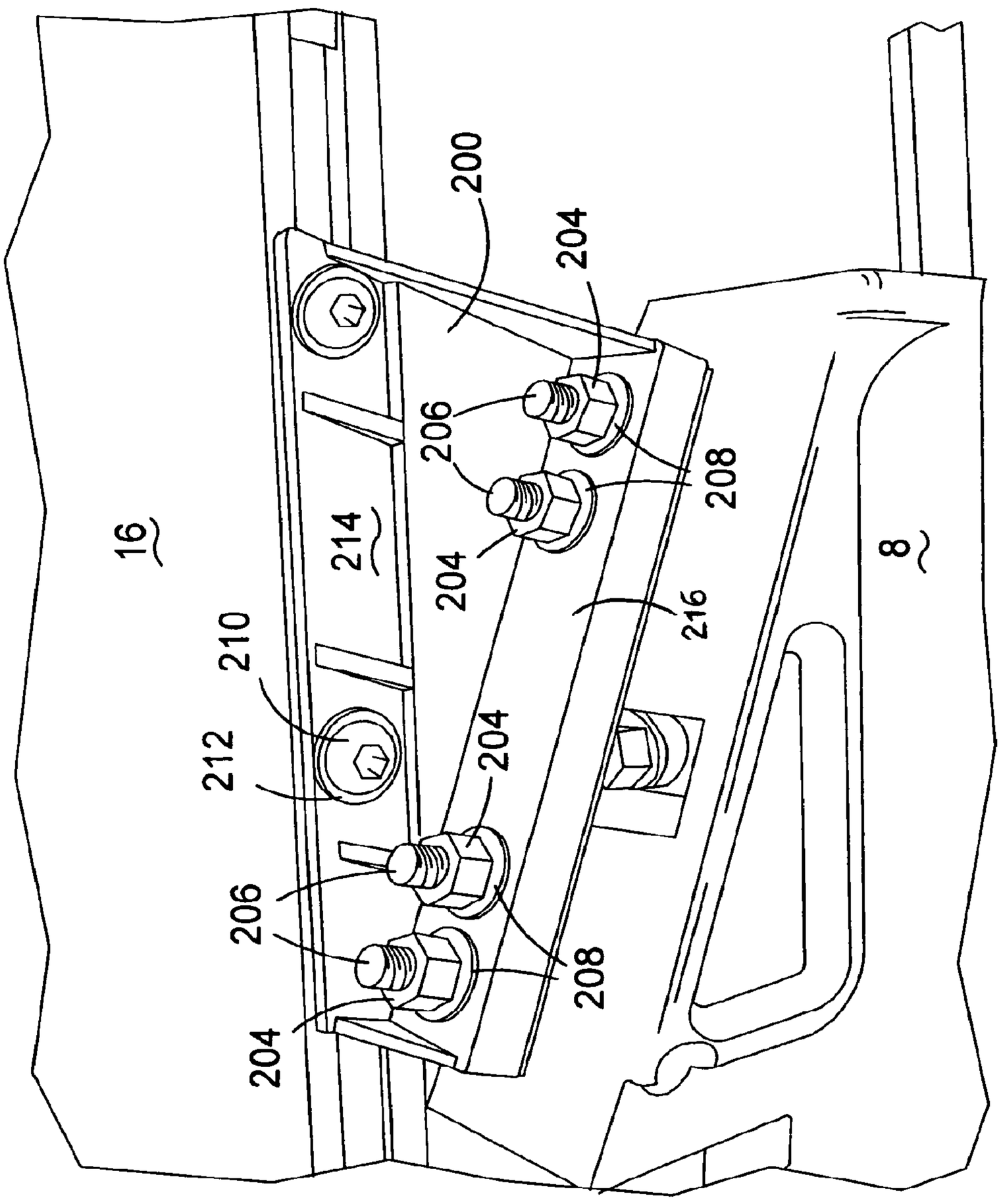
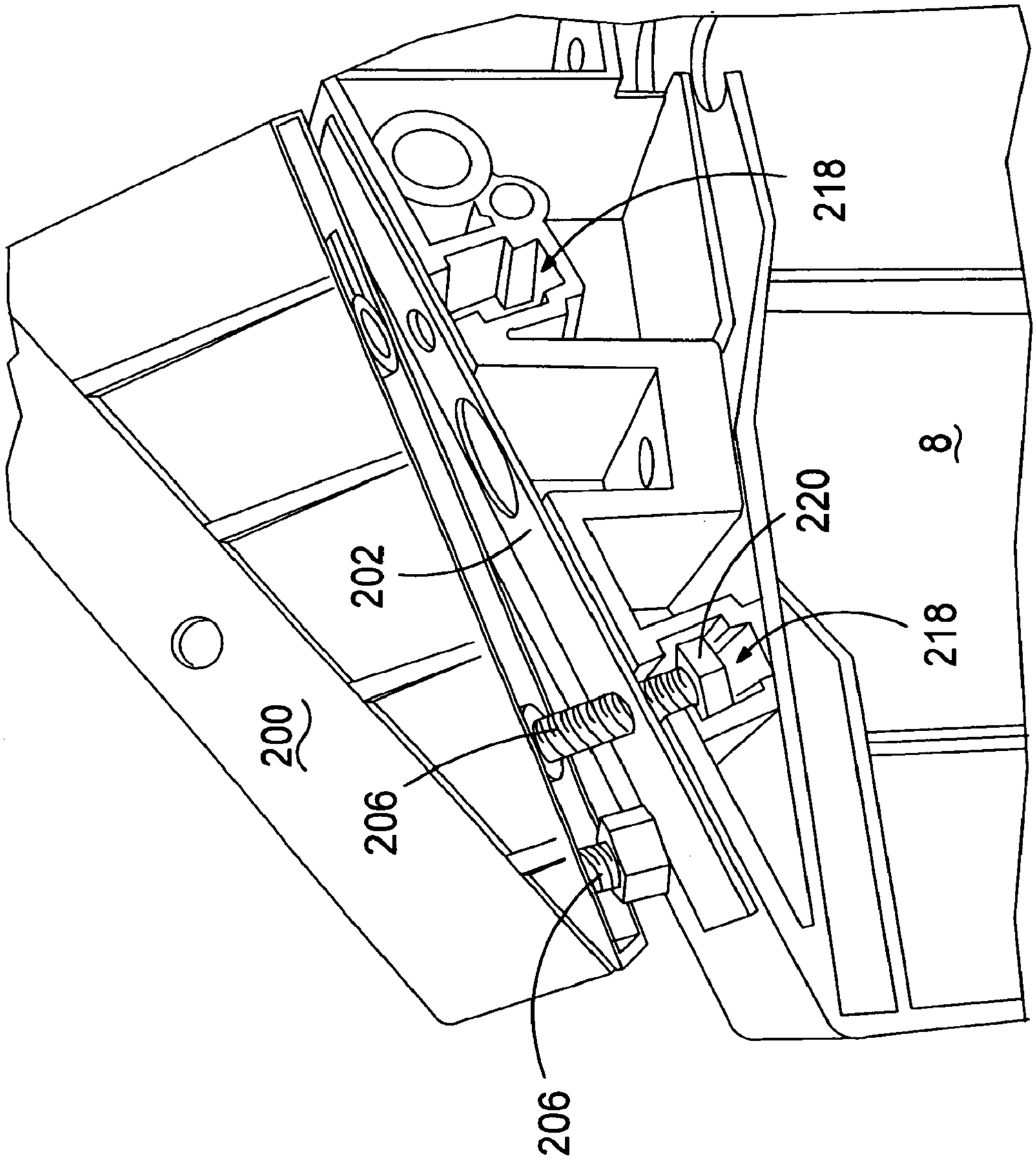


FIG.16

FIG.17



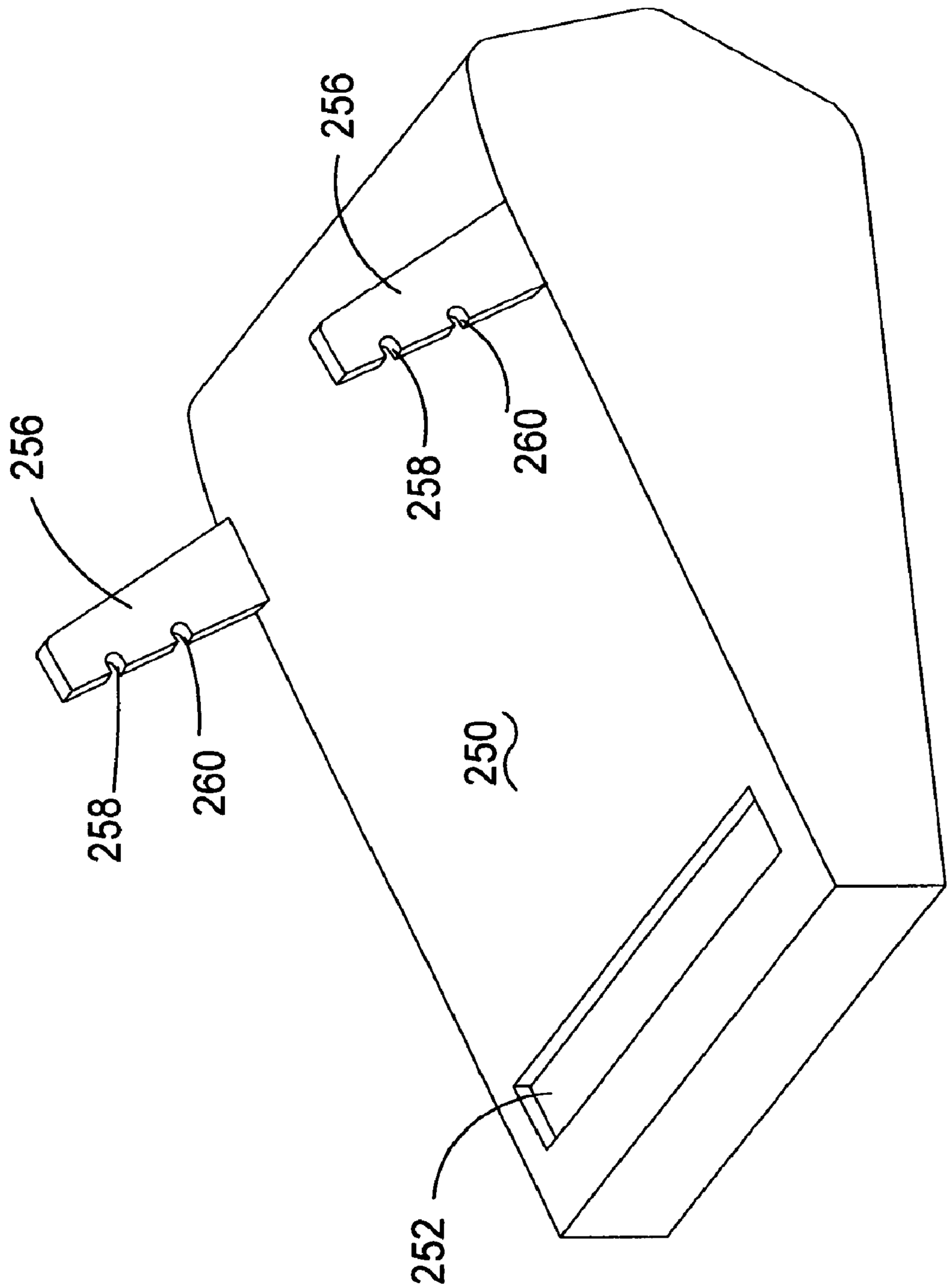


FIG.18

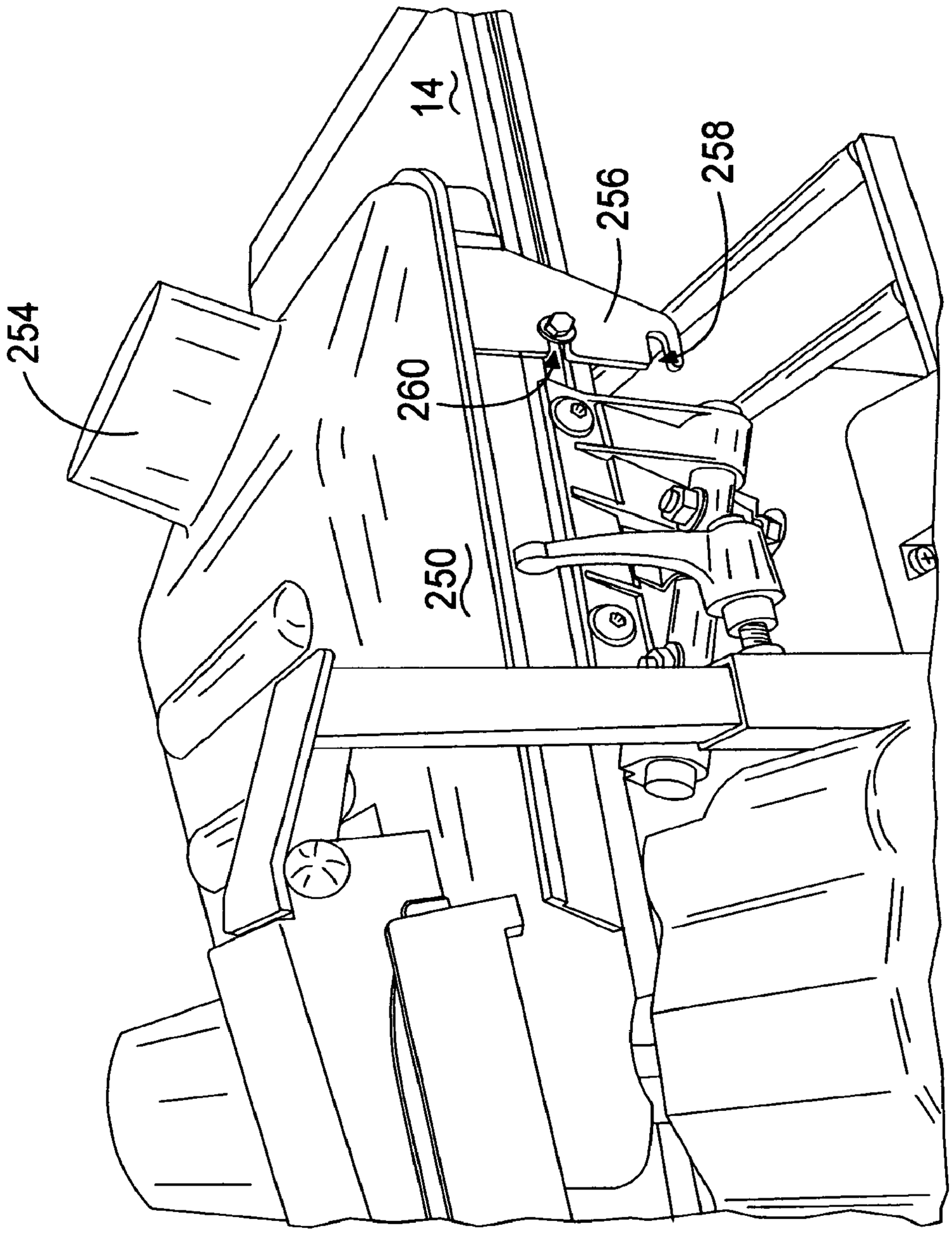


FIG.19

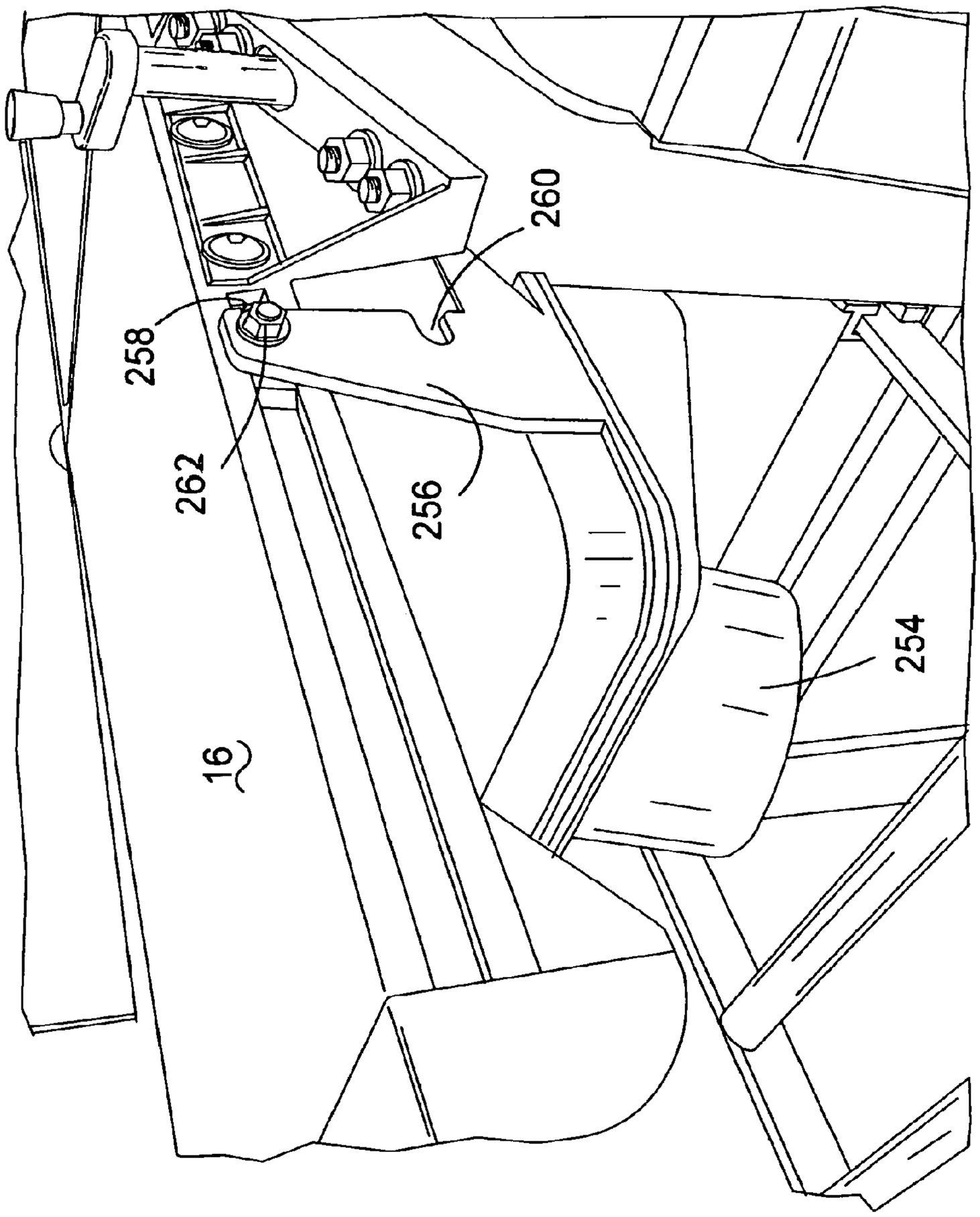


FIG.20

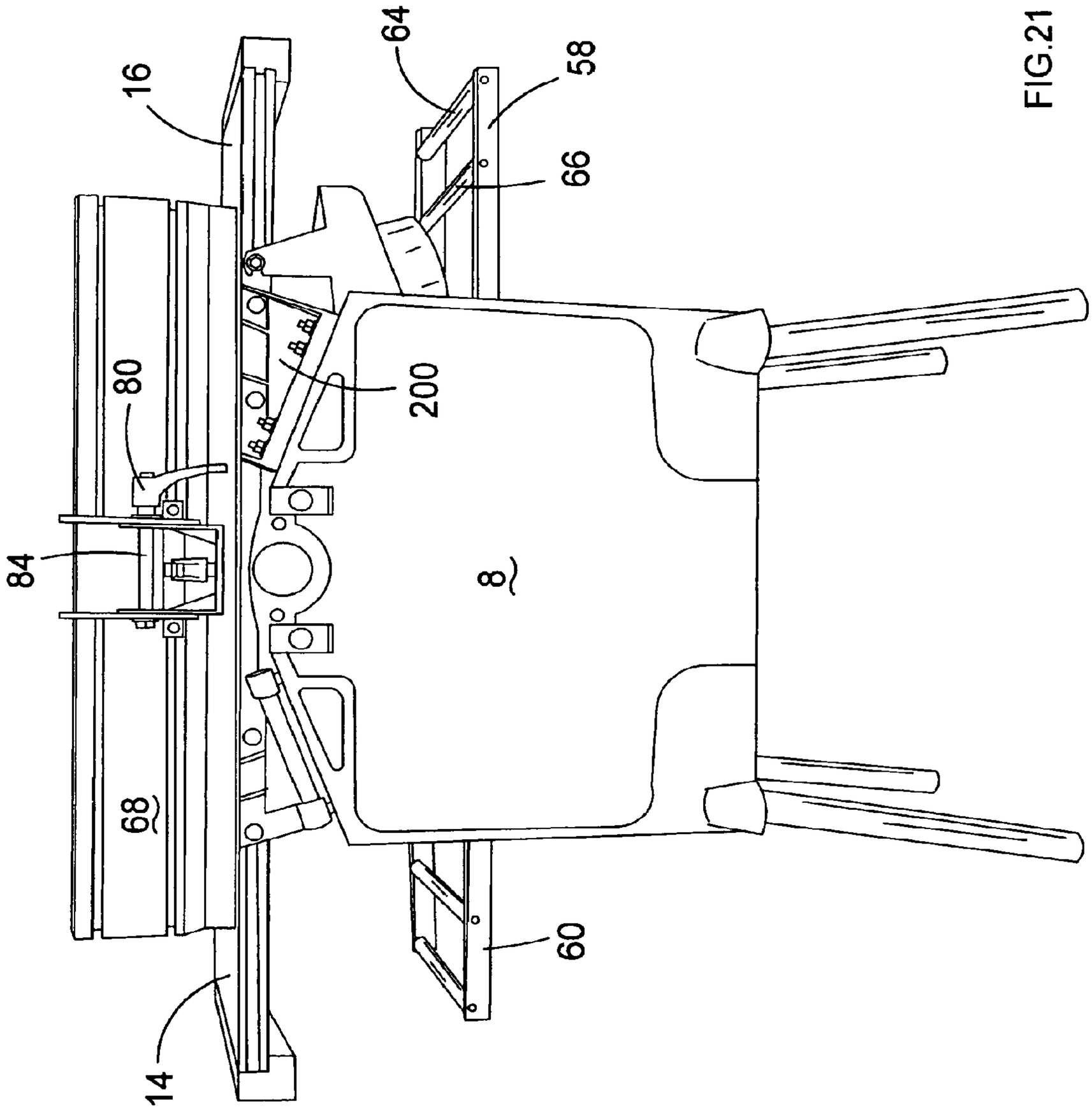


FIG.21

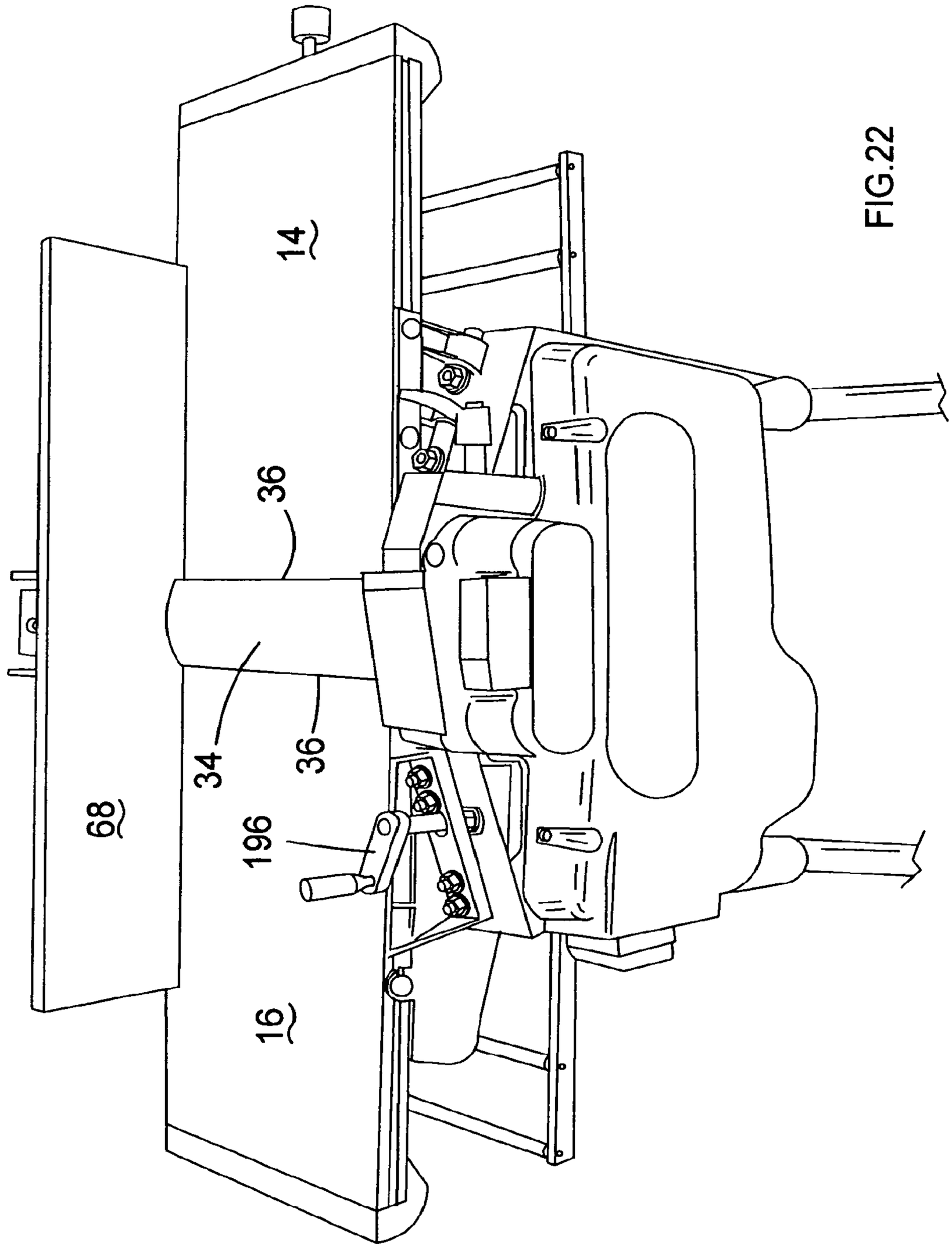


FIG.22

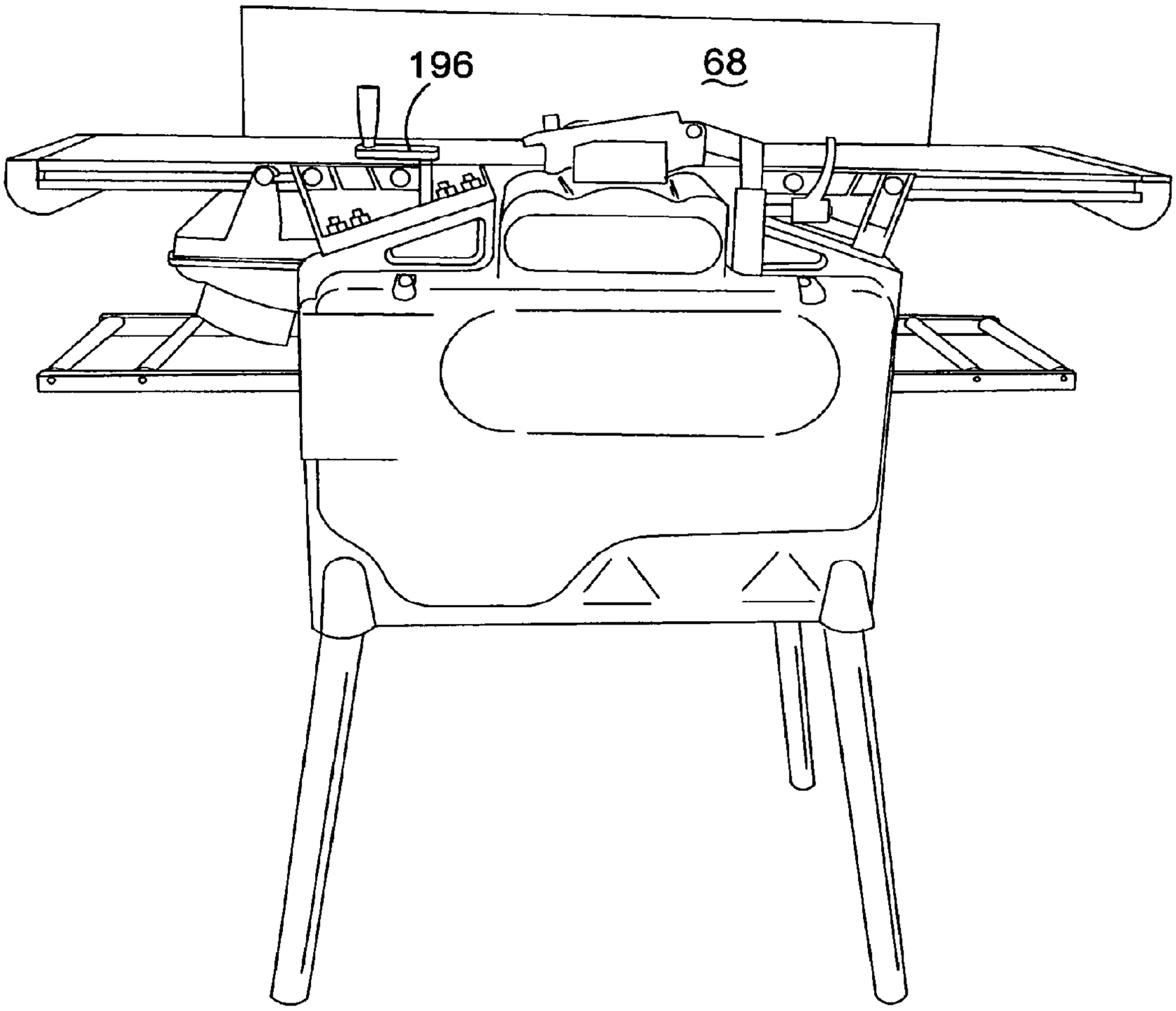


FIG.23

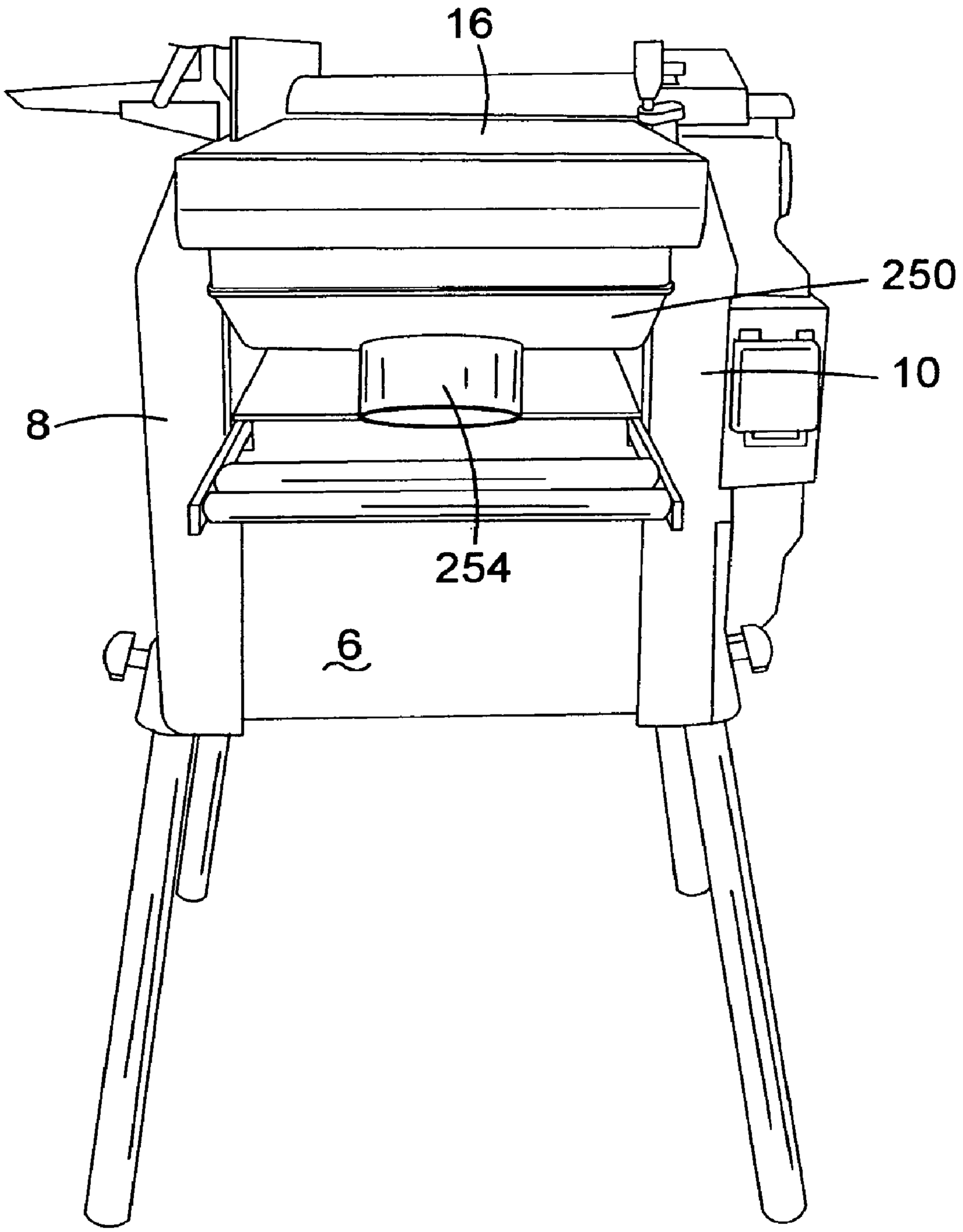


FIG.24

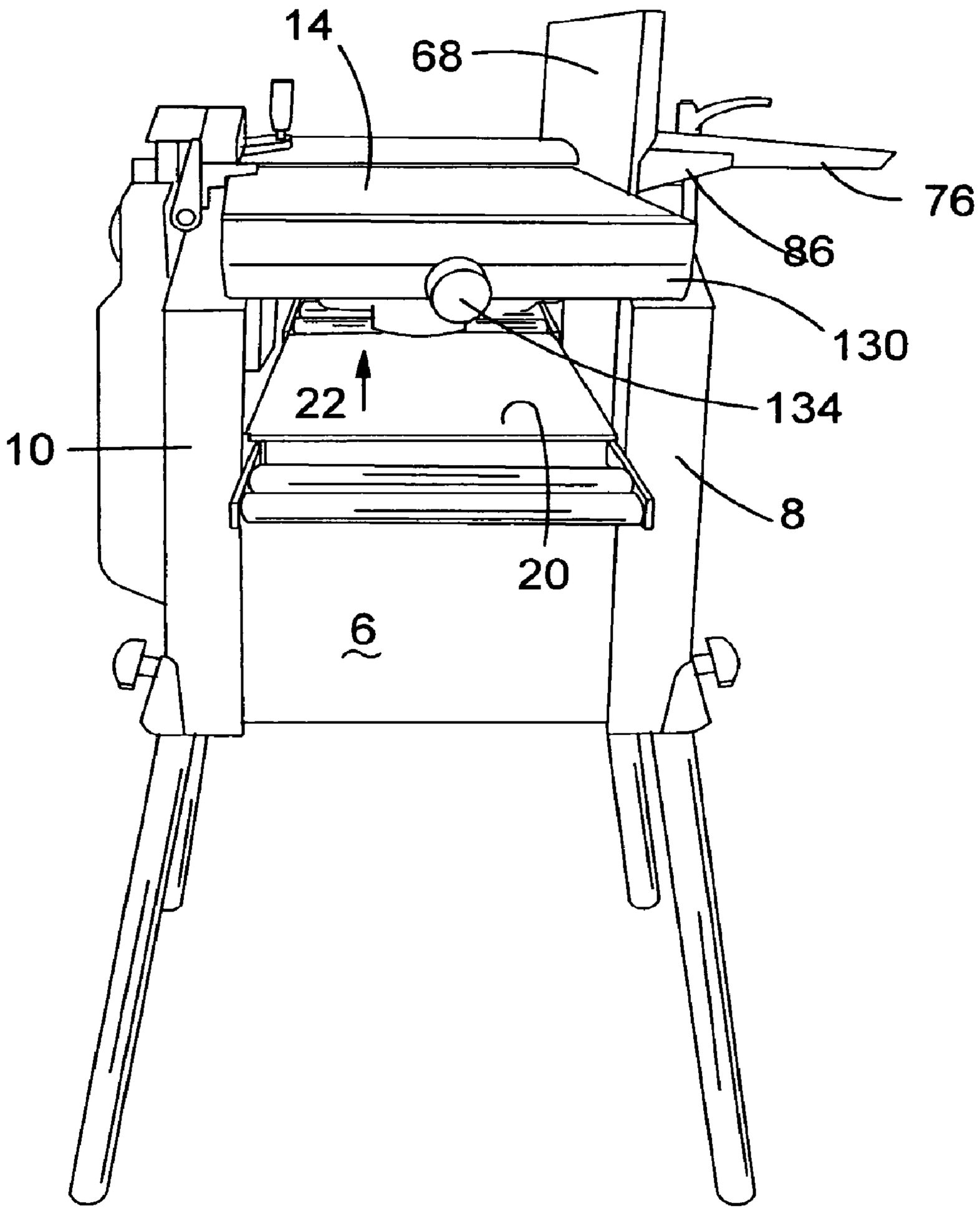


FIG.25

PLANER AND THICKNESSER

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a divisional of U.S. patent application Ser. No. 12/424,669 filed on Apr. 16, 2009, now U.S. Pat. No. 7,913,728, which is a divisional of U.S. patent application Ser. No. 12/004,840, filed Dec. 21, 2007, now U.S. Pat. No. 7,588,063, which is a divisional of U.S. patent application Ser. No. 11/068,300 filed on Feb. 28, 2005, now U.S. Pat. No. 7,527,080. Priority to British Application No. GB 04 045 57.1, filed Mar. 2, 2004 is claimed under 35 U.S.C. §119. The disclosures of the above applications are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention generally relates to planers and thicknessers.

BACKGROUND OF THE INVENTION

A typical planer and thicknesser comprises a rectangular, box-like frame comprising a horizontal rectangular upper table and a base connected to each other along their longer sides by two side walls. The horizontal upper table is located directly above the rectangular base. A first aperture is formed by one of the shorter ends of the upper table and by the base and one end of each of the two side walls. Similarly, a second aperture is formed on the opposite side of the rectangular box frame by the other shorter end of the upper table and the other end of the base, together with the other ends of each of the side walls. A passage way connects the two apertures to each other.

The upper table is constructed from two rectangular sections, a front section and a rear section. The two sections of the upper table are constructed from single rectangular sheets of metal having smooth top surfaces. The top surface of the front section is parallel to the top surface of the rear section. Both the top surfaces are smooth so that a work piece can be slideably moved across their surfaces. The height of the front section can be adjusted relative to the height of the rear section. The two sections are separated by a slot.

A horizontal lower table is movably located within the passage way. The plane of the lower table is parallel to that of the upper table. The lower table is constructed as a single rectangular sheet of metal having a smooth top surface. The lower table extends through the full length of the passage way from the first aperture to the second aperture. The width of the table is slightly less than that the width of the passage way. The table is mounted in such a manner that it can be moved vertically upwards or downwards, the top surface of the table remaining horizontal at all times during this process.

A cutting drum is rotatably mounted between the two side walls in such a manner that its axis of rotation is perpendicular to the plane of the side walls and parallel to the planes of the upper and lower tables. The cutting drum can be rotatably driven by an electric motor mounted within the base. The axis of rotation of the cutting drum is located below the upper table.

A part of the periphery of the cutting drum along its length extends upwardly through the slot between the front and rear sections of the upper table.

Each of the two cutting blades are mounted within a groove of the cutting drum which runs along the length of the cutting drum in well known manner parallel to the axis of rotation.

The cutting blades of the cutting drum can be used to cut work pieces in well known manner which are either slideably moved across the upper table in one direction or are slideably moved across the lower table in the other direction.

The cutting drum is located so that, as the cutting drum rotates, the maximum height of the cutting blades mounted within the cutting drum through the slot are approximately the same as the height of the rear section of the upper table, the height of the rear section being fixed relative to the frame.

Two drive rollers are mounted on either side of the cutting drum between the side walls in such a manner that their axes of rotation are parallel to that of the cutting drum. The two drive rollers are rotatably driven by the same electric motor which is used to drive the cutting drum. The function of the two drive rollers is to move any work pieces which are fed into the rectangular passageway across the lower table and to engage the cutting blades at their lowest point as the rotating cutting drum rotates.

A planer and thicknesser can be used in two different modes of operation.

In the first mode of operation, a work piece is slideably moved across the upper table in order to remove the surface of the work piece which is adjacent to the smooth top surface of the upper table. The height of the front section of the upper table determines the amount of material which is to be removed from the work piece. First, the height of the front section is adjusted so that the cutting action of the rotating drum removes the right thickness of material from the lower surface of the work piece. Next, the cutting drum is then rotatingly driven by the electric motor. While the cutting drum is rotating, the work piece is slideably moved across the front section of the upper table until it engages the cutting blades of the cutting drum as they rotate. The work piece is then pushed onto the rear section of the upper table across the rotating cutting drum. As the work piece passes over the rotating blades of the cutting drum, the cutting blades remove material from the underside of the work piece.

In the second mode of operation, a work piece is slideably moved across the smooth surface of the lower table in order to remove the top surface of the work piece. The height of the lower table within the passageway determines the amount of material which will be removed from the top surface of the work piece as it is passes through the passageway. First, the height of the lower table is adjusted so that the cutting action of the rotating drum removes the correct thickness of material from the top surface of the work piece. Next, the cutting drum is then rotatingly driven by the electric motor. While the cutting drum is rotating, the work piece is slideably moved across the lower table, until the upper surface of the work piece engages the cutting blades of the cutting drum as a cutting drum rotates. As the work piece passes under the cutting blades, the cutting blades remove material from the topside of the work piece. The two drive rollers, which are also being rotatingly driven by the electric motor, help move the work piece through the passageway.

However, there are a number of problems associated with existing designs of planer and thicknessers.

The object of the present invention is to improve the design and construction of the planer and thicknessers.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections

mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; a cover mounted above the upper table capable of being moved from a first position where it is adjacent to the upper table and covers the lengthwise section of the periphery of the cutting drum which projects upwardly through the slot to a second position where it is above and away from the upper table; wherein the cover can be moved perpendicularly relative to the plane of the upper table from the first position to the second position.

According to a second aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections which are mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; wherein there is provided at least one extension to the lower table which attaches to one end of the lower table and extends from the end of lower table through one of the apertures and away from the frame.

According to a third aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections which are mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; a side fence assembly for guiding a work piece across the upper table, the side fence assembly comprising a pivotal guard, wherein the pivotal guard is mounted on to the frame through a tilt mechanism, the tilt mechanism comprises at least one bracket connected to the guard and a second bracket connected to the frame; one bracket comprising an arcuate slot; the second bracket comprising an aperture; the two brackets being moveable relative to each other so that the aperture can align with any part of the arcuate slot; and a holding member which passes through the aperture and arcuate slot and is capable of releasably locking one bracket to the other bracket preventing any relative movement between the two.

According to a fourth aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; a side fence assembly for guiding a work piece across the upper table, the side fence assembly comprises a guard; wherein the guard is connected to the frame through a slide mechanism to allow the guard to be moved across the upper table, the slide mechanism comprising a slide piece slideably mounted on a guide support; the guide support comprising a channel having outwardly sloping walls; a part of the slide piece being located within and capable of sliding along the channel; and a locking mechanism which can lock the guide support to slide piece.

According to a fifth aspect of the present invention, there is provided a side fence assembly for guiding a work piece across the upper table of a planer and thicknesser; the side fence assembly comprising a pivotal guard; wherein the pivotal guard is mounted on to the frame through a tilt mechanism, the tilt mechanism comprising at least one bracket connected to the guard and a second bracket connected to the frame; one bracket comprising an arcuate slot; the second bracket comprising an aperture; the two brackets moveable relative to each other so that the aperture can be aligned with any part of the arcuate slot; and a holding member which passes through the aperture and arcuate slot and is capable of releasably locking one bracket to the other to prevent any relative movement between the two brackets.

According to a sixth aspect of the present invention, there is provided a side fence assembly for guiding a work piece across an upper table of a planer and thicknesser, the side fence assembly comprising a guard; wherein the guard is mounted on to the frame through a slide mechanism to allow the guard to be moved across the upper table, the slide mechanism comprising a slide piece slideably mounted on a guide support; the guide support comprising a channel having outwardly sloping walls; a part of the slide piece being located within and capable of sliding along the channel; and a locking mechanism which can lock the guide support to slide piece.

According to a seventh aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; wherein the front section of the upper table is mounted onto the frame through a height adjustment mechanism; wherein the height adjustment mechanism comprises a guide mechanism to control the direction of movement of the front section relative to the frame and a drive mechanism to enable a person to move the front section; the guide mechanism comprises a telescopic guide comprising a first part mounted

onto the frame and a second part telescopically connected to the first part on one end and mounted to the front section of the upper table on the other end.

According to an eighth aspect of the present invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; two rollers located within the passageway; and a motor for rotatingly driving the rollers and cutting drum, wherein the motor is capable of rotatingly driving a drive gear via a belt which in turn drives a driven gear which rotatingly drives a drive cog, the drive cog in turn rotatingly drives a chain which engages a plurality of cogs mounted on the ends of each of the rollers to rotate the rollers.

According to a ninth aspect of the invention, there is provided a planer and thicknesser comprising a frame having a passage way which extends through the frame from one aperture in a wall of the frame to another aperture in a wall of the frame; an upper table having front and rear sections mounted on the frame in such a manner as to form a slot between the front and rear sections of the upper table; a cutting drum rotatably mounted within the frame such that an upper lengthwise section of the periphery of the cutting drum projects upwardly through the slot and a lower lengthwise section of the periphery of the cutting drum projects downwardly into the passage way; a lower table, substantially parallel to the upper table, mounted either within the passageway or forms the base of the passageway, below the cutting drum; and a dust extractor; wherein the dust extractor is capable of being connected to the underside of the upper table when the upper table is being used and being connected to top of the upper table when the lower table is being used.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of each of the above inventions will now be described with reference to the accompanying drawings of which:

FIG. **1** shows a perspective view of a planer and thicknesser;

FIG. **2** shows a perspective view of a cover which can be used with a slot through which the periphery of a rotating cutting drum and cutting blades project on an upper table when the cutting drum is rotating;

FIG. **3** shows, a perspective view of a height adjustment mechanism for the cover of FIG. **2**;

FIG. **4** shows a perspective view of an extension to a lower table;

FIG. **5** shows a perspective view of a side fence assembly;

FIG. **6** shows a side view of a tilt mechanism of the side fence assembly with a guard at a first angle of tilt;

FIG. **7** shows a side view of the tilt mechanism of the side fence assembly with the guard at a second angle of tilt;

FIGS. **8** and **9** show a side view of a slide mechanism for the side fence assembly;

FIG. **10** shows a perspective view of a slide guide;

FIG. **11** shows a perspective view of a drive mechanism for controlling the movement of a front section of the upper table;

FIG. **12** shows a perspective view of a drive mechanism for two rollers and the cutting drum;

FIG. **13** shows a perspective view of the two rollers;

FIGS. **14** and **15** show a perspective view of a height adjustment mechanism for a lower table;

FIGS. **16** and **17** show a perspective view of a mounting mechanism for a rear section of the upper table;

FIG. **18** shows a top perspective view of a dust extractor;

FIGS. **19** and **20** show the dust extractor located above and below the upper table respectively;

FIG. **21** shows a rear view of the planer and thicknesser;

FIG. **22** shows a downward front perspective view of the planer and thicknesser;

FIG. **23** shows a front view of the planer and thicknesser;

FIG. **24** shows a side view of the planer and thicknesser; and

FIG. **25** shows a second side view of the planer and thicknesser.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The planer and thicknesser of the present invention comprises a rectangular, box like frame **2** comprising a horizontal rectangular upper table **4** and a rectangular base **6** connected to each other along their longer sides by two vertical sidewalls **8**, **10**. Preferably, the horizontal upper table **4** is located above and runs parallel to the rectangular base **6**. A first rectangular aperture **12** may be formed by one of the shorter ends of the upper table **4** and of the base and one end of each of the two side walls **8**, **10**. Similarly, a second rectangular aperture (not shown) may be formed on the opposite side of the rectangular box frame **2** by the other two shorter ends of the upper table **4** and rectangular base **6** and the other ends of each of the side walls. Preferably, a. passage way **22**, of rectangular cross-section, connects the two rectangular apertures **12** to each other, the two rectangular apertures **12** being substantially parallel to each other.

The upper table **4** is preferably constructed from two rectangular sections, a front section **14** and a rear section **16**. The two sections **14**, **16** of the upper table are constructed from single rectangular sheets of metal having substantially smooth top surfaces. The top surface of the front section may be substantially parallel to the top surface of the rear section. Both the top surfaces are substantially smooth so that a work piece can be slideably moved across their surfaces. The height of the front section **14** can be adjusted relative to the height of the rear section **16**. The mechanism by which the height is adjusted will be described in more detail below. The two sections **14**, **16** are separated by a slot **18**.

In a preferred embodiment, a horizontal lower table **20** is movably located within the rectangular passage way **22**. The plane of the lower table is substantially parallel to that of the upper table. The lower table **20** may be constructed as single rectangular sheet of metal having a substantially smooth top surface. The lower table **20** preferably extends through the full length of the passage way **22** from the first aperture **12** to the second aperture. The width of the table **20** is slightly less than that the width of the passage way **22**. In a preferred embodiment, the table is mounted in such a manner that it may be moved vertically upwards or downwards with the top surface of the table **20** remaining horizontal at all times during this process: The mechanism by which the lower table **20** is moved up and down is described in more detail below.

In a preferred embodiment, a cutting drum **24** is rotatably mounted between the two side walls **8**, **10** in such a manner that its axis of rotation is perpendicular to the plane of the side walls **8**, **10** and parallel to the planes of the upper and lower tables **4**, **20**. The cutting drum **24** can be rotatably driven by an electric motor (not shown) mounted within the base **6** of the rectangular box like frame **2**. The mechanism by which the cutting drum **24** is rotatably driven by the electric motor is described in more detail below.

A part **26** of the periphery of the cutting drum, along its length, preferably extends through the slot **18** between the front and rear sections **14**, **16** of the upper table **4**.

In a preferred embodiment, two cutting blades **28** are mounted within a groove of the cutting drum **24** which runs along the length of the cutting drum **24**, in a well known manner, parallel to the axis of rotation. The cutting blades **28** of the cutting drum can be used to cut work pieces in a well known manner which are either slideably moved across the upper table **4** in one direction or are slideably moved across the lower table **20** in the other direction.

The cutting drum **24** is located so that, as the cutting drum **24** rotates, the maximum height of the cutting blades **28** mounted within the cutting drum **24** through the slot **18** are the same as the height of the rear section **16** of the upper table, the height of the rear section **16** being fixed.

Two drive rollers **30**, **32** (not shown) are preferably mounted on either side of the cutting drum between the side walls in such a manner that their axes of rotation are parallel to that of the cutting drum **24**. The two drive rollers **30**, **32** are rotatably driven by the same electric motor which is used to drive cutting drum **24**. The mechanism by which the electric motor rotatingly drives the two drive rollers **30**, **32** is described in more detail below. The function of the two drive rollers **30**, **32** is to move any work pieces that are fed into the rectangular passageway **22** across the lower table **20** and engage the cutting blades **28** as they pass below the axis of rotation of the rotating cutting drum **24** at its lowest point.

The planer and thicknesser may be used in two different modes of operation.

In a first mode of operation, a work piece is slideably moved across the upper table **4** in order to remove the surface of the work piece that is adjacent to the smooth top surface of the upper table **4**. The height of the front section **14** of the upper table **4** determines the amount of material to be removed from the work piece. The height of the front section **14** may be adjusted so that the cutting action of the rotating drum **24** removes the right thickness of material from the lower surface of the work piece. The cutting drum **24** is rotatingly driven by the electric motor. While the cutting drum **24** is rotating, the work piece is slideably moved across the front section **14** of the upper table until it engages the cutting blades **28** of the cutting drum **24** as they rotate, which repeatedly pass through the slot **18** between the front **14** and rear **16** sections. The work piece is slideably moved onto the rear section **16** of the upper table across the rotating cutting drum **24**. As the work piece passes over the rotating blades **28** of the cutting drum **24**, the cutting blades **28** remove material from the underside of the work piece.

In a second mode of operation, a work piece is slideably moved across the smooth surface of the lower table **20** in order to remove the top surface of the work piece. The height of the lower table **20** within the passageway **22** determines the amount of material which will be removed from the top surface of the work piece as the work piece passes through the passageway **22**. The height of the lower table may be adjusted so that the cutting action of the rotating drum **24** removes the correct thickness of material from the top surface of the work piece. The cutting drum **24** is rotatingly driven by the electric motor. While the cutting drum **24** is rotating, the work piece is slideably moved across the lower table **20**, until the upper surface of the work piece engages the cutting blades **28** of the cutting drum **24** as the cutting drum **24** rotates. As the work piece passes under the cutting blades **28**, the cutting blades **28** remove material from the top surface of the work piece. The two drive rollers **30**, **32**, which are also being rotatingly driven by the electric motor, help move the work piece through the passageway **22**.

When the planer and thicknesser is being used in the second mode of operation, it is desirable to place a cover over the slot **18** in the upper table through which the periphery of the rotating cutting drum **24** and the cutting blades **28** project. The construction of such a cover, according to a preferred embodiment of the present invention, will now be described with reference to FIGS. **2** and **3**.

In a preferred embodiment, the cover comprises a substantially curved rectangular shield **34** which may extend across the width of the planer and thicknesser above the upper table **4**. The curved shield **34** may have a length that is slightly longer than the width of the two sections **14**, **16** of the upper table **4**. The width of the curved shield **34** preferably is sufficient to fully cover the slot **18** between the front and rear sections **14**,**16** of the upper table **4** and to enable the longer edges **36** of the curved shield **34** to engage the front and rear sections **14**,**16** of the upper table. Preferably, the shield **34** is curved so that when it is placed against the upper table **4**, with the lengthwise edges **36** of the curved shield engaging the front and rear sections **14**,**16** of the upper table, it surrounds part **26** of cutting drum **24**, and the cutting blades **28** which protrude through the slot **18** between the front and rear sections **14**,**16**, without having any contact with the cutting blades **28** or the cutting drum **24**, allowing the cutting drum **24** to freely rotate when the shield **34** is placed over the slot.

In a preferred embodiment, the curved shield **34** is slidably supported by mount **38**. The curved shield **34** is capable of sliding within the mount **38** in a direction parallel to that of the axis of rotation of the cutting drum **24** and longitudinal axis of the slot **18** i.e. across the width of the upper table **4**. This enables the curved shield **34** to be moved out of the way from the slot **18** to allow the upper table **4** to be used when the planer and thicknesser is being used in its first mode of operation. At one end of the curved shield **34**, there preferably is a stop **40** which prevents the curved shield from sliding too far through the mount **38**. A threaded bolt (not shown) threadably engages the mount **38** so that rotation of the bolt causes the bolt to screw into or out of the mount **38** vertically. When the bolt is screwed into the mount **38**, the lower end of the bolt engages with the upper surface of the curved shield **34** to lock the curved shield **34** in position relative to the mount **38** in order to prevent it from sliding within the. mount. A knob **42** (not shown) may be attached to the opposite upper end of the threaded bolt to enable the user to screw the bolt into or out of the mount **38**.

In a preferred embodiment, the mount **38** is attached to a side wall **10** of the planer and thicknesser via a telescopic frame. The frame enables a user to adjust the height of the mount **38**, and hence the curved shield **34**. The frame preferably comprises two sections, a lower frame section **44** comprising a lower metal tube of square cross-section mounted on the side wall **10** of the planer and thicknesser so that the longitudinal axis of the lower metal tube is substantially vertical, and an upper frame section **46** comprising an upper metal tube similarly of square cross-section, and a horizontal metal bar **48**. The upper metal tube **46** has a smaller cross-sectional area to enable it to slide into or out of the lower metal

tube **44**. A hole (not shown) may be formed in a side of the lower frame section **44** which is threaded to allow a bolt **50** to be screwed into or out of the lower metal tube **44**. A handle **52** can be attached to one end of the bolt **50**. The bolt **50** is used to secure the position of the upper metal tube **46** within the lower metal tube **44** by having the end of the bolt **50**, within the lower metal tube **44**, engage a side of the upper metal tube **46**.

The metal bar **48**, which extends sideways from the upper metal tube **46** of the upper frame section, connects the mount **38** to the upper metal tube **46**.

In use, an operator is able to lower or raise the mount **38**, thereby lowering or raising the curved shield **34** by unscrewing the bolt **50**, using the handle **52**, so that the end of the bolt **50** disengages from the side of the of the upper metal tube **46**. The operator can then slide the upper metal tube into or out of the lower metal tube **44** to the desired position, and then screw the bolt **50** into the lower metal tube **44** so that the end engages with the side of the upper metal tube **46**, thereby locking it and the mount **38** at a desired height.

A vertical elongate slot **54** may be formed in another wall of the lower metal tube **44**. A second bolt **56** is screwed into the side of the upper metal tube **46**, the head of which passes through the slot **54**. The function of the slot **54** and the bolt **56** is to limit the range of vertical movement of the upper metal tube **46** within the lower metal tube **44** and also to prevent it from being removed from the lower metal tube **44**.

By adjusting the height of the mount **38** and sliding the curved shield **34** within the mount **38**, an operator is able to move the curved shield **34** from a position that covers the part **26** of the rotating cutting drum **24** and blades **28** projecting upwardly through the slot **18**, to a position where it is out of the way of the part **26** of cutting drum **24** and cutting blades **28** projecting upwardly through the slot **18**, to allow the upper table **4** to be freely used in the first mode of operation of the planer and thicknesser.

The construction of an extension to the lower table **20** of a preferred embodiment of the present invention will now be described with reference to FIG. **4**.

In a preferred embodiment, the extension comprises two extension bars **58**, **60** of the same shape attached to the end **62** of the lower table **20**, which extend horizontally and parallel to each other in the plane of the lower table **20** away from the lower table **20** out through one of the apertures **12** and away from the rectangular box frame **2**. Preferably, two extension rods **64**, **66** connect the two extension bars **58**, **60**. The two extension rods **64**, **66** are fixed in parallel, one rod **64** being connected between the two ends of the extension bars **58**, **60** and the other rod **66** being attached between the two bars **58**, **60** part way along the length of the two bars.

Both the front **14** and rear **16** sections of the upper table **4** of the planer and thicknesser are securely attached to the rectangular box frame **2** (though the height of the front section **14** can be adjusted relative to the rectangular box frame). As such, access to the lower table **20** by the operator is made difficult. This results in the operator having difficulty in feeding the work piece into the aperture **12** prior to it being passed through the passageway **22**. By providing an extension to the lower table **20**, its enables the operator to feed the work piece into the planer and thicknesser when it is being used in its second mode of operation with greater ease.

The construction of the side fence assembly according to a preferred embodiment of the present invention will now be described with reference to FIGS. **5** through **9**.

In a preferred embodiment, mounted on the side of the rectangular box frame **2** adjacent the side of the upper table **4**, is a side fence assembly. The side fence assembly preferably comprises a guard **68** which extends along a substantial part of the length of the upper table **4**. The guard **68** has a substantially smooth surface **70** along which a work piece can be slideably moved as it is passed over the upper table **4**. The function of the side fence assembly is to assist the operator in guiding the work piece over the upper table **4** when removing material from the lower surface of the work piece. The operator can push the work piece against the smooth surface **70** of the guard **68** and then slide the work piece along the surface **70** of the guard in order to control the movement of the work piece.

The smooth surface **70** of the guard **68** is capable of being angled relative to the plane of the upper surface of the upper table **4** through a range of angular positions. This range of positions include having the smooth surface **70** of the guard **68** being perpendicular to the plane of the upper table **4** as shown in FIG. **6** or at an angle where the guard **68** is approaching the **45** degrees to the plane of the upper table **4** as shown in FIG. **7**. The mechanism by which the guard **68** can be tilted relative to the plane of the upper table **4** is herein referred to as the tilt mechanism. The tilt mechanism preferably only allows the surface **70** of the guard **68** to be pivoted about a horizontal axis. In addition, the guard **68** can be moved backwards and forwards across the width of the surface of the upper table **4** in a direction which is parallel to the axis of rotation of the rotating cutting drum **24**. The mechanism by which the guard **68** is moved relative to the upper table **4** is referred to as the slide mechanism. The slide mechanism does not enable the guard **68** to pivot in any way.

The tilt mechanism will now be described in more detail with reference to FIGS. **5**, **6** and **7**.

Referring to FIG. **5**, in a preferred embodiment, two brackets **72** are attached to the rear of the guard **68**. The brackets **72** are preferably mounted side by side, in parallel to each other, and project outwardly from the guard **68**. Each bracket **72** may be manufactured from a sheet of metal. An arcuate slot **74** is formed in each of the brackets **72** which runs from the top of the bracket to the base of the bracket in a curved manner as shown in FIG. **7**. The arcuate slot **74** in each bracket **72** is located in a corresponding position to the arcuate slot **74** in the other bracket in a symmetrical fashion.

In a preferred embodiment, the slide mechanism, which is described in more detail below, comprises a slide piece **76**. The slide piece **76** may be formed from cast metal. Formed on one end of the slide piece are two preferably integral brackets **78** which extend upwardly and in parallel to each other. An aperture is formed in each of the brackets which is aligned with the aperture in the other bracket. The two brackets **78** of the slide piece **76** may be located between the two brackets **72** attached to the rear of the guard **68**. Each of the brackets **78** on the slide piece may be flush with a corresponding bracket **72** mounted on the rear of the guard **68** as shown.

Preferably, a bolt (not visible) passes through the arcuate slot **74** of one of the brackets **72** attached to the rear of the guard **68**, through the aperture formed in one of the brackets **78** on the slide piece **76** which is flush with that bracket **72**, across the gap between the two integral brackets **78** on the slide piece **76**, through the aperture of the other bracket **78** on the slide piece **76**, and through the arcuate slot **74** of the second bracket **72** mounted on the rear of guard **68** flush with that bracket **78**. A handle **80** may be attached to one end of the bolt and a nut **82** may be screwed onto the other end.

In a preferred embodiment, between the handle **80** and the side of the bracket **72** on the guard **68** adjacent the handle **80** is a washer **84** having an outer diameter which is greater than the width of the arcuate slots **74** and an inner diameter which is less than that of the base of the handle **80**. Located on the

other end of the bolt between the nut **82** and the other bracket **72** mounted on the rear of the guard **68** adjacent the nut **82**, is a second washer (not visible) which also has a diameter greater than the size of the arcuate slot **74** in that bracket **72** and an inner diameter less than the outer diameter of the nut **82**. The bolt passes through the length of a metal tube **84** which is located between the two brackets formed on the slide piece **76**. The diameter of the tube **84** is greater than that of the holes formed through the brackets **78** in the slide piece **76**. The length of the tube **84** is the same as that of the size of the gap between the brackets **78** on the slide piece **76**.

In a preferred embodiment, the tilt mechanism is operated by tightening the bolt and nut **82** using the handle **80** which causes each pair of adjacent brackets **72**, **78** mounted on the rear of the guard **68** and the slide piece **76** to be sandwiched between the adjacent end of the tube **84** surrounding the bolt and the washer located on the other side of the adjacent pair of brackets **72**, **78**. In order to loosen the tilt mechanism, the bolt and nut **82** are unscrewed using the handle **80**, releasing the sandwiching pressure on the two pair of brackets **72**, **78** allowing the guard **68** to be tilted to an appropriate angle. The guard **68** is tilted by sliding the bolt within the arcuate slots **74** until the guard is at the correct position. Once located at the appropriate angle, the bolt and nut **82** are tightened again, reapplying the sandwiching force onto the two adjacent brackets **72**, **78** preventing any further movement of the guard **68**. FIG. **6** shows a guard **68** in a vertical position while FIG. **7** shows a guard is an angled position with the bolt located in a different part of the arcuate slots **74**.

The slide mechanism will now be described in more detail with reference to FIGS. **5**, **8** and **9**.

In a preferred embodiment, the slide mechanism comprises the slide piece **76** and a guide support **86**. The guide support **86** is mounted onto the side of the frame **2** of the planer and thicknesser adjacent to the side of the upper table **4** by the use of two bolts **88** which attach the guide support **86** to the side wall of the rectangular box frame **2**.

The guide support **86** preferably comprises a channel **90** having a uniform cross-section which extends in parallel to the axis of rotation of the cutting drum **24**. The channel **90** comprises two side walls **92** which are preferably angled relative to the vertical, the width of the channel **90** expanding in a direction away from the base **94** of the channel **90**. The base **94** of the channel **90** is flat and horizontal. Two ridges **96** may run along the length of the channel as shown in a symmetrical fashion parallel to the longitudinal axis of the channel **90**. A hole can be formed vertically through the guide support **86**, the entrance of which is located centrally in the surface of the base **94** of the channel **90**. A bolt **98** is located within the aperture, the head of the bolt (not shown) located below the guide support **86**, the other end of the bolt projecting vertically upwards from the entrance of the aperture into the channel **90** as shown in FIGS. **7** and **8**.

The guide support may be made from cast metal.

The shape of the underside of the slide piece **76** preferably corresponds to the shape of the channel **90** in the guide support **86**. The slide piece **76** is located within the channel and is capable of sliding within the channel along its length. An elongate slot **100** may be formed centrally along a substantial part of the length of the slide piece **76** as shown in FIG. **5**. The width of the slot is greater than that of the diameter of the bolt **98**. When the slide piece **76** is mounted on the guide support **86**, the bolt **98** may extend through the slot **100** as shown in FIG. **5**. A nut (not shown) which has a diameter greater than the width of the slot **100** can be screwed onto the bolt **98**. Preferably, a handle **102** surrounds the nut and is used to rotate the nut in order to screw it onto the bolt **98**. The bolt **98** is prevented from rotating. When the nut is screwed securely onto the bolt **98**, it sandwiches the slide piece **76** and the guide support **86** together preventing any relative movement. Similarly, when the nut is unscrewed from the bolt **98**, the sandwiching force is removed allowing the slide piece **76** to slide within the guide support **86**.

In a preferred use, an operator would loosen the nut on the bolt **98** by rotating the handle **102** and then sliding the slide piece **76** within the guide support **86**, thus moving the guard **68** across the upper table **4**. Once the guard **68** is located at the correct position on the upper table, the handle **102** is then rotated screwing the nut onto the bolt **98** sandwiching the slide piece **76** and the guide support **86** together.

The construction of the height adjustment mechanism for the front section of the upper table of a preferred embodiment of the present invention will now be described with reference to FIGS. **10** and **11**.

In a preferred embodiment, the front section **14** of the upper table is capable of having its height adjusted. The front section **14** may be mounted on the rectangular box frame **2** using two slide guides as shown in FIG. **10**. The slide guides can be mounted on either side of the front section **14**. The slide guides allow the front section to be moved linearly at an angle to the horizontal to adjust the height of front section **14**. The purpose of moving it at an angle is to compensate for the fact that the cutting drum **24**, and hence the path swept out by the cutting blades **28** when the cutting drum **24** is rotated, is round. Thus, as the height of the front section **14** increases, the front edge of the front section, which forms the edge of the slot **18**, needs to move towards the rear section **16** narrowing the slot **18** if the distance between the edge of the front section **14** and the cutting drum **24** is to be maintained. A drive mechanism may be incorporated to enable an operator to adjust the height of front section.

The description of the construction of one of the slide guides will now be given. The design of both of them is the same.

In a preferred embodiment, attached to one side of the front section **14**, is a metal cast **110**, as shown in FIG. **10**. The metal cast **110** can be attached to the front section **14** by the two bolts **112**. Formed on one end of the metal cast **110** is a protrusion **114** which has a socket (not shown) for receiving the end of a metal tube **116** of circular cross-section. The metal tube **116** may be rigidly fixed within the socket and movement between the two is prevented. A second metal tube **118** also of circular cross-section, but of smaller diameter than the first metal tube **116**, can be mounted so that it is partially within the first metal tube **116**. The second smaller metal tube **118** is co-axial with and able to telescope into and out of the first metal tube **116**. Preferably, the second metal tube **118** extends from the end of the first metal tube **116** through a hole formed in a bracket **120** which is integral with the metal cast **110**. The second metal tube **118** can freely slide within the hole of the metal bracket **120**.

Preferably, a first bolt and nut **122** rigidly connects the second metal tube **118** to the top of the rectangular box frame **2**. The bolt **122** prevents movement of the second metal tube **118** relative to the rectangular box frame **2**. The height of the second metal tube **118** above the box frame can be altered by adjusting the nut on the bolt to raise or lower the second metal tube **118**.

A second bolt **124**, preferably, passes through an elongate slot formed through the sides of the first metal tube **116**. The second bolt **124** can freely slide within the elongate slot. The second bolt **124** acts as a guide for the first metal tube **116** allowing it to slide axially while preventing it from moving sideways. Nuts screwed onto the bolt together with washers

provide the means by which the tube is guided. The height of the first metal tube **116** above the box frame can be altered by adjusting the nut on the bolt **124** to raise or lower the first metal tube.

In a preferred embodiment, the two metal tubes act as a guide for the direction of movement of the front section **14** of the upper table when it is moved. The front section travels in a direction which is parallel to the longitudinal axes of the two tubes **116**, **118**. When the front section is pushed or pulled to the left or right, the second metal tube **118** either telescopes into or out of the first metal tube **116**, the direction of movement being restrained by the interaction of the two metal tubes **116**, **118**. The angle of the two metal tubes can be adjusted by adjusting the nuts on the two bolts **122**, **124**, thus raising and lowering the heights of the first second tubes.

A painted scale **126** can be added onto the second metal tube **118** of one of the slide guides. A metal pointer **128** can also be added to the corresponding metal cast **110** which points towards the scale **126** and provides an indication of the height of the front section **14**.

The drive mechanism by which the front section of the upper table is moved will now be described.

In a preferred embodiment, rigidly attached to the front end of the front section **14** of the upper table **4** is a plastic bumper **130**. Passing through the plastic bumper **130** is a metal rod **132**. The rod **132** may be arranged in such a manner that it can freely rotate within the plastic bumper **130** but cannot axially slide through the plastic bumper **130**. A knob **134** can be attached to the end of the rod **132**. Rotation of the knob **134** results in the rotation of the rod **132**.

A hole is formed in the end **136** of the rod **132** which is opposite to the knob **134**. The hole is co-axial with the rod **132**. The inner wall of the hole may be threaded.

In a preferred embodiment, attached between the two walls **8**, **10** of the rectangular box frame **2** is a second metal rod **138**. A threaded bolt **144** may pass through a hole formed in the centre of the second rod **138** as shown in FIG. **11**. A nut **140**, in conjunction with the head **142** of the bolt **144**, holds the metal bolt **144** in position in relation to the second rod **138**. The end **136** of the first rod **132** with the hole is screwed onto the threaded section of the bolt **144**. Rotation of the first rod **132** results in the first rod **132** being screwed onto the bolt **144** causing the rod **132** together with the plastic bumper **130** to move as the rod screws onto the bolt **144**. Rotation of the knob **134** in a first direction results in the rod **132** and plastic bumper **130** and knob **134** moving in a first direction and rotation of the knob **134** in the opposite direction results in the rod **132** together the plastic bumper **130** and knob **134** moving in the second direction. As a first section **14** of the upper table is connected to the plastic bumper **130**, movement of the bumper results in movement of the front section **14** of the upper table **4**.

Preferably, a locking nut **146** is threadably attached to the rod between the knob **134** and the plastic bumper **130**. Rotation of the locking nut **146** causes it to engage the plastic bumper **130** and to pull the rod **132** through the plastic bumper **130**. However, the plastic bumper **130** and rod **132** are arranged so that no axial movement is allowed between the two, only rotational. This causes the locking knob **146** to lock the rod **132** and prevents any rotation thereof.

The drive mechanism is used to move the front section **14** backwards and forwards by rotation of the knob **134**. The slide guide is used to control the direction of movement, the direction being restricted to that of the longitudinal axis of the two metal tubes **116**,**118**.

The drive mechanism for the planer and thicknesser will now be described with reference to FIGS. **12** and **13**.

In a preferred embodiment, an electric motor (not shown) is mounted within the base **6** of the box frame **2**. Two bolts **150** can be used to attach the electric motor to the side of the frame which can be slackened off in order to adjust the position of electric motor. As can be seen in FIG. **17**, the spindle **152** of the electric motor projects through an aperture in the side wall of the rectangular box frame **2**.

Two wheels **154** may be rigidly mounted adjacent to each other on the spindle **152** as shown in FIG. **12**.

Two rollers **156**, **158**, as shown in FIG. **13**, can be mounted on either side of the cutting drum **24** in such a manner that their axes of rotation are parallel to each other and to the axis of rotation of the cutting drum **24**. The first roller **156** is preferably constructed from a metal rod of circular cross section and has a knurled surface. The second roller **158** is preferably constructed from a metal rod of circular cross section and is surrounded by rubber. Mounted on one of the ends of the two rollers are cogs **160**, **162** as shown in FIG. **12**.

Rotatably mounted onto the side of the wall of the rectangular box frame is a first gear **164**. Integrally formed with the first gear **164** is a cog which is coaxial with the axis of rotation of the first gear **164**. In a preferred embodiment, a chain **166** wraps around the cog of the first gear **164** and the two cogs **160**,**162** on the ends of the two rollers **156**,**158**. Rotation of the first gear **164** results in rotation of the cog of the first gear **164** which in turn causes the two cogs **160**,**162** and hence the two rollers **156**,**158** to rotate. An adjustment cog **168** is rotatably mounted upon arm **170** which is pivotally attached to the first gear **164** and which can pivot about the axis of rotation of the first gear **164**. The spring **172** biases the cog **168** into engagement with the chain **166** which causes the chain **166** to be tightened. The adjustment cog **168** is used to ensure that the chain **166** is maintained at the correct tension.

In a preferred embodiment, a second gear **174** meshes with the first gear **164**. The second gear **174** is rotatably mounted on the side wall of the rectangular box frame **2**. The second gear **174** is integrally formed with a wheel **176**. A rubber band **178** passes around the wheel **176** and around one of the wheels **154** mounted on the spindle **152** of the motor. Rotation of the spindle of electric motor results in rotation of the wheel **176** due to the rubber band **178**. This results in rotation of the second gear **174** which in turn drives the first gear **164**. Thus, rotation of electric motor results in rotation of the two rollers **156**, **158**.

A second rubber band **180** connects the other wheel **154** mounted on the spindle **152** of the motor and the axle **182** upon which the cutting drum **24** is mounted within the rectangular box light frame **2**. Thus, rotation of the spindle of electric motor results in rotation of the cutting drum **24**.

Preferably, the various wheels are sized and arranged so that the correct speeds for the two rollers and for the cutting drum are achieved by the rotation of electric motor.

The height adjustment mechanism of the lower table will now be described with reference to FIGS. **1**, **4**, **14** and **15**.

In a preferred embodiment, the lower table **20** has four apertures formed through the four corners of the table **20**, the longitudinal axes of the four apertures being vertical. The cross-section of each of the four apertures may be circular, the inner walls of the aperture may be threaded along the length of the aperture. A threaded rod **190** passes through each of the four apertures, the thread of the rod **190** engaging with the thread of the aperture. Each of the four rods **190** is rotatably mounted vertically within the box like frame **2** and is capable of being rotated about its longitudinal axis. Rotation of each of the four rods **190** results in the lower table **20** moving along the length of rod **190** due to interaction of the threads on each of the rods **190** and the walls of the aperture in lower table **20**.

Mounted on the lower end of each of the rods is a cog **192** as shown in FIGS. **14** and **15**. Preferably, a chain **194** wraps around all four cogs such that rotation of one rod results in rotation of all four rods **190**. This ensures that the lower table **20** is moved up and down the uniform fashion at all four corners. When the planer and thicknesser is assembled, the lower table is mounted onto the four rods **190** so that it is substantially horizontal.

In a preferred embodiment, one rod **190** extends from within the inside the rectangular frame through the top surface of the frame. A handle **196** is mounted on the top of that rod **190** and the operator would rotate the handle **196** causing the rod **190** attached to the handle **196** to rotate, which in turn rotates all four rods **190** due to the chain **194**. As the rods **190** rotate, the lower table is lifted or lowered as the lower table is screwed up or down.

The rear section mounts will now be described with reference to FIGS. **16** and **17**.

In a preferred embodiment, the rear section **16** of the upper table **4** is rigidly mounted to the top of the rectangular box like frame **2** of the planer and thicknesser. The rear section **16** may be attached to the frame using two mounts, one located on either side of the rear section. Each mount comprises a metal cast **200**, a metal plate **202**, four mounting nuts **204**, bolts **206** and washers **208**, and two attachment bolts **210** and washers **212**.

Each metal cast **200** comprises a vertical wall **214** connected to a horizontal base **216** as shown in FIG. **16**. The vertical wall **214** of the metal cast **200** comprises two holes. The metal cast **200** is attached to the side of the rear section **16** using two attachment bolts **210** which pass through the two holes in the vertical wall **214**, through the washers **212** and then are of screwed into the side of the rear section **16**.

Preferably, four holes are formed through the horizontal base **216** through which the mounting bolts **206** will pass.

Formed in the upper part of each of the side walls **8**,**10** of the rectangular box frame **2** are two slots **218** which are each intended to receive a head **220** of one of the mounting bolts **206**, as shown in FIG. **17**.

The metal plates **202** comprises two holes through which the mounting bolts **206**, which will have their heads **220** located within the slots **218** in the side walls **8**,**10**, will pass. When the metal cast **200** is attached to the top of the wall **8**, **10**, the metal plate **202** is sandwiched between the lower surface of the metal cast **200** and the upper surface of the wall **8**, **10**. Preferably, the head **220** of the two mounting bolts **206** are located in the two slots **218** formed in the upper wall, the shaft of the bolts passing through apertures in the metal plate **202** and then through two apertures in the base of the metal cast **200**. The two other bolts **206** pass through the two remaining apertures in the base of the metal cast, the heads of those bolts are, preferably, sandwiched between the lower surface of the metal cast **200** and the upper surface of the metal plate **202**. Mounting nuts **204** are then screwed onto the ends of the bolts **206** sandwiching the washers **208** against the upper surface of the base **216** of the cast, as shown in FIG. **16**.

By adjusting the tightness of the nuts **204** on the mounting bolts **206**, the position of the heads of the bolts can be adjusted slightly, thereby creating a biasing force on the plate **202** as it is flexed slightly due to the positions of the heads of the bolts **206**. This allows a slight amount of movement of the metal cast **200** relative to the side wall **8**, **10** of the frame. Therefore, by adjusting the bolts **206**, the metal cast **200** can be angled correctly to enable the rear section **16** of the upper table **4** to be adjusted so that it is horizontal.

The dust extractor will now be described with reference to FIGS. **18**, **19** and **20**.

In a preferred embodiment, the dust extractor comprises a plastic box **250** having on its upper surface at one end a rectangular aperture **252** formed through the upper wall across the width of the box. Located at the other end of the plastic box on the lower surface of the box is a tube **254** of circular cross-section which extends downwardly. The tube **254** is aligned with a circular aperture within the wall of the box **250** so that air and any entrained debris can pass through the tube and into the box. Preferably, two arms **256** mounted on the side of the box extend upwardly from the box **250**. Two horizontal slots **258**,**260** are formed within the arms **256** as shown in FIGS. **18**, **19** and **20**. The dust extractor can be attached to the top of the thicknesser and planer or underneath depending on which mode of operation the planer and thicknesser is being used.

In the first mode of operation, the dust extractor is connected to the underside of the rear section **16** of the upper table as shown in FIG. **20**. Bolts **262** screwed into the side of the rear section **16** pass through the upper slots **258** of the arms **256**. The bolts **262** are used to sandwich and hold the arm **256** against the side of the rear section **16**. The rectangular aperture **252** is aligned with the underside of the rotating cutting drum **24**. A vacuum cleaner is then attached to the tube **254**. As a work piece is cut on the upper table **4**, the chips formed pass through the rectangular aperture **252** and into the box and are then sucked out through the circular tube **254**.

When the planer and thicknesser is used in the second mode of operation, the dust extractor is located on top of the front section **14** of the upper table **4**, bolts **262** passing through the lower slots **260** of the arms are used to sandwiched the arms **256** against the sides of the upper table **4** are shown in FIG. **19**. Again, the rectangular aperture **252** is aligned with the cutting drum **24**. As a work piece is passed over the lower table, any chips which are removed by the rotating cutting drum **24** pass through the rectangular aperture **252** and into the box **250**. The vacuum cleaner is attached to the circular tube **254** in order to remove the chips from the box **250**.

Whereas particular embodiments of the invention have been described herein for the purpose of illustrating the invention and not for the purpose of limiting the same, it will be appreciated by those of ordinary skill in the art that numerous variations of the details, materials, and arrangement of parts may be made within the principle and scope of the invention without departing from the invention as described in the appended claims.

The invention claimed is:

1. A side fence assembly for guiding a work piece across an upper surface of a planer and thicknesser, the side fence assembly comprising a tilt mechanism and a pivotal guard,

the tilt mechanism comprising:

at least one bracket connected to the guard;

a corresponding at least one bracket connected to the planer and thicknesser;

one of the at least one guard or the at least one planer and thicknesser brackets comprising an arcuate slot;

the other one of the at least one guard or the at least one planer and thicknesser brackets comprising an aperture; and

a corresponding at least one holding member,

wherein the brackets are moveable relative to each other so that the at least one aperture can be aligned with any part of the corresponding arcuate slot and wherein the corresponding holding member passes through the corresponding aperture and arcuate slot and is capable of releasably locking the corresponding slotted bracket to

the corresponding aperture bracket to prevent any relative movement between the brackets,

the pivotal guard attaches to the planer and thicknesser through the tilt mechanism.

2. The side fence assembly of claim **1** wherein the tilt mechanism further comprises:

two brackets, each including at least one arcuate slot; and

two brackets, each including at least one aperture,

wherein each of the brackets having an arcuate slot are aligned with a bracket having an aperture.

3. The side fence assembly of claim **1**, wherein the tilt mechanism further comprises:

two holding members, each passing through the aperture and the arcuate slot of the brackets,

wherein each of the holding members lock two brackets together by applying a force to the brackets to frictionally engage the brackets.

4. The side fence assembly of claim **1**, wherein the holding member further comprises:

a nut; and

a bolt which passes through the aperture and the arcuate slot of the brackets,

wherein the nut is screwed onto the bolt, exerting a force on the two brackets thereby preventing relative movement between the two brackets.

5. The side fence assembly of claim **1**, wherein the side fence assembly further comprises:

a slide mechanism that allows the guard to move with respect to the planar and thicknesser, the slide mechanism further comprises a slide piece connected to a guide support;

the guide support comprises a channel having outwardly sloping walls; and

a locking mechanism,

wherein a portion of the slide piece is located within the channel and is capable of sliding along the channel and wherein the locking mechanism can lock the guide support to the slide piece.

6. The side fence assembly of claim **5**, wherein the channel comprises at least one ridge which runs along at least part of the length of the channel.

7. The side fence assembly of claim **5**, wherein the locking mechanism comprises a projection member that extends from the base of the channel through a slot formed in the slide piece which enables the guide support and the slide piece to be force fit together to prevent relative movement between the guide support and the slide piece.

8. The side fence assembly of claim **7**, wherein the projection member comprises a bolt onto which a nut can be threadably attached to force fit the guide support to the slide piece.

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